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DEPARTMENT OF THE ARMY FIELD MANUAL

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ARMORED DIVISION ENGINEER BATTALION

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HEADQUARTERS, DEPARTMENT OF THE ARMY
MAY 1958

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FIELD MANUAL
No. 5-134

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *5 May 1958*

ARMORED DIVISION ENGINEER BATTALION

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*This manual supersedes FM 5-134, 2 March 1954, and Training Text 5-134-2 February 1957.

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Purpose

The purpose of this manual is to provide guidance to the officers and noncommissioned officers of the armored division engineer battalion in the performance of their duties.

2. Scope

This manual contains specific material on the organization, mission, employment, operational methods, training, equipment, administration, and special problems of the armored division engineer battalion. It is based upon TOE (ROCAD) 5–215, 5–216, 5–217, and 5–218. Minor changes in TOE will not affect the manual since organization and equipment are not discussed in detail. The material presented herein is applicable to atomic warfare. Where applicable, appropriate modifying guidance for nonatomic warfare is integrated throughout the manual.

Note. See FM 17–50 for logistical policies and procedures.

Section II. ORGANIZATION AND EQUIPMENT

3. Mission

The mission of the armored engineer battalion is to increase the combat effectiveness of the Armored Division by means of general engineer

work, and to undertake and carry out the combat missions of an armored infantry battalion when required.

4. Organization of Armored Division

a. The armored division consists of an armored division headquarters and headquarters company, 3 armored division combat commands, 4 armored infantry battalions, 4 armored division armor battalions, 90mm, an armored cavalry squadron, armored division artillery, an armored division engineer battalion, an armored division signal battalion, an armored division aviation company, an armored division military police company, and a headquarters and headquarters battery, 3 FA howitzer battalions, 105mm, SP, and an armored division FA composite battalion. This composite battalion consists of 2 FA howitzer batteries, 155mm, SP, a FA howitzer battery, 8 inch, SP, and 1 FA missile battery, 762mm RKT, SP. The division trains comprises a headquarters and headquarters detachment, armored division trains and armored division band, an armored division administration company, an armored division medical battalion, an armored division ordnance battalion, and an armored division quartermaster battalion (fig. 1).

b. The armored division has no fixed combat command organization. The attachment of the combat, combat support, and service elements of the division to appropriate control headquarters must be accomplished prior to engaging in combat. Five major tactical grouping are normally employed: division troops, division trains, and

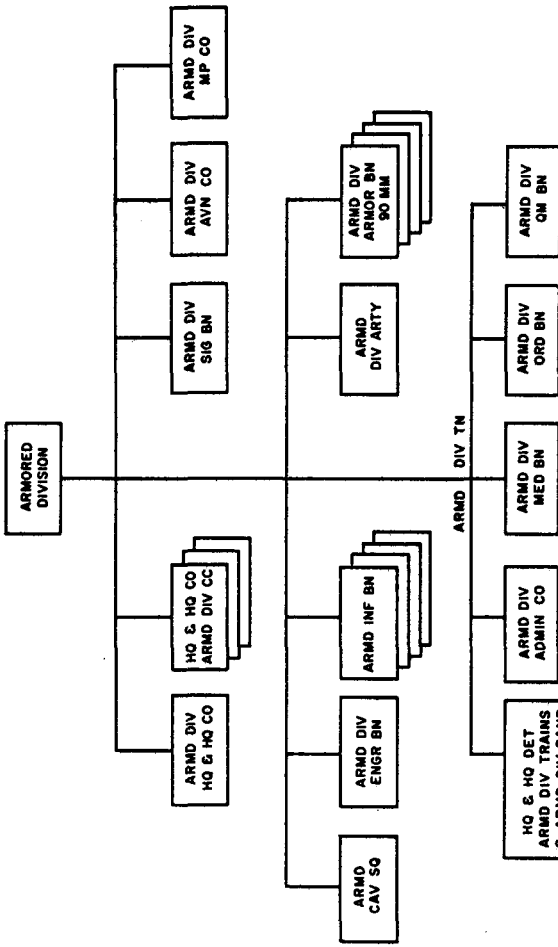


Figure 1. Organization of the armored division.

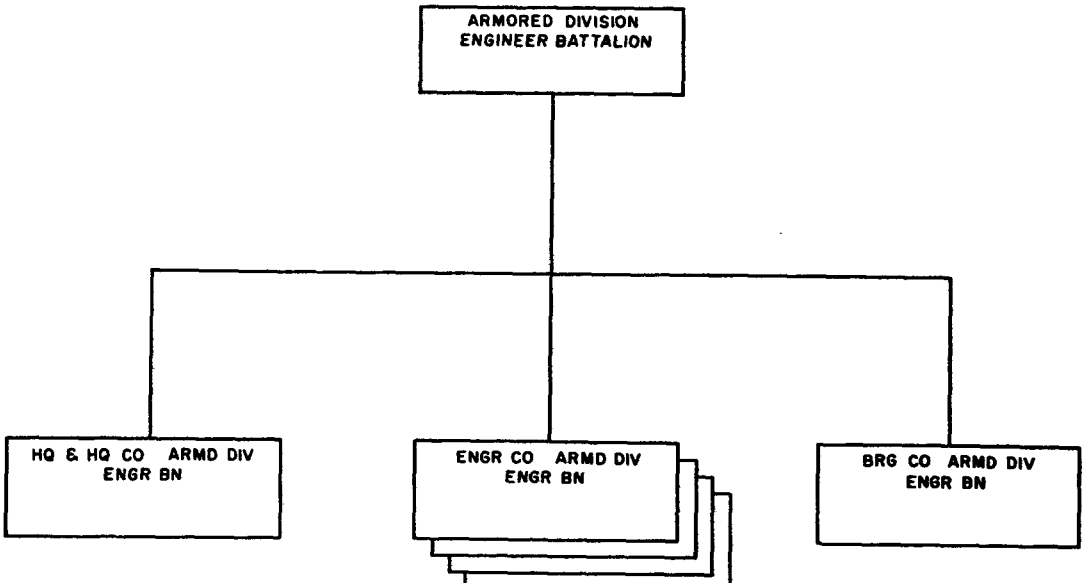


Figure 2. Organizational chart, armored division engineer battalion, TOE 5-215 (ROCAD).

the three combat commands. Additional tactical groupings may be organized when suitable control headquarters are attached to the division, for example, as armored cavalry regiment.

5. Organization of Engineer Battalion

The armored division engineer battalion consists of a headquarters and headquarters company, four identical engineer companies, and a bridge company (fig. 2).

Section III. ASSIGNMENT AND CAPABILITIES

6. Assignment

The armored division engineer battalion is the engineer component of the armored division as indicated in TOE 17.

7. Capabilities

a. General. In normal operations, the armored division engineer battalion provides forward engineer support for the armored division. It receives support from corps engineer troops in accomplishing engineer work in the division rear area, in major river crossings, and other special operations requiring additional engineer effort. Assistance in engineer staff planning may also be provided by the supporting engineer unit or by the corps engineer.

b. Capabilities. The following functions and tasks are carried out in furtherance of the general mission of providing engineer support for the armored division.

(1) Provides engineer staff planning and

supervision for organic and attached engineer troops.

(2) Performs construction, repair, and maintenance of roads, bridges, fords, and culverts.

(3) Provides support of hasty stream crossing operations of opportunity with boats, rafts, and bridges; coordination of organic and attached engineer troops for deliberate river crossings.

(4) Provides fixed bridging for passage of short gaps.

(5) Assists in removal of obstacles, including mines and boobytraps.

(6) Assists in the emplacement of obstacles, including mines and boobytraps.

(7) Prepares and executes demolitions, including employment of prepositioned nuclear weapons.

(8) Assists other troops in preparation of fortifications and camouflage.

(9) Performs engineer reconnaissance and intelligence.

(10) Provides general construction, including construction of aircraft landing strips.

(11) Performs construction and placement of deceptive devices.

(12) Provides engineer Class II and IV supplies.

(13) Provides engineer field maintenance support.

(14) Provides water purification and supply.

(15) Provides map supply.

(16) Provides technical advice to supported units on engineering matters, including recommendations for employment of engineer troops.

(17) Provides engineer assistance in assault of fortified position.

(18) Exploits locally available sources of materials for construction, fortifications, and camouflage.

CHAPTER 2
ARMORED ENGINEER COMPANY

Section I. GENERAL

8. Mission

The armored engineer company is an operating component of the armored division engineer battalion and the basic administrative unit in the battalion. It is equipped to perform general engineer work facilitating and contributing to the combat effectiveness of the Armored Division. When required, it undertakes and carries out the combat missions of an armored infantry company.

9. Organization of Armored Engineer Company

The engineer company has a company headquarters and three platoons. Each platoon has a headquarters and three squads (fig. 3).

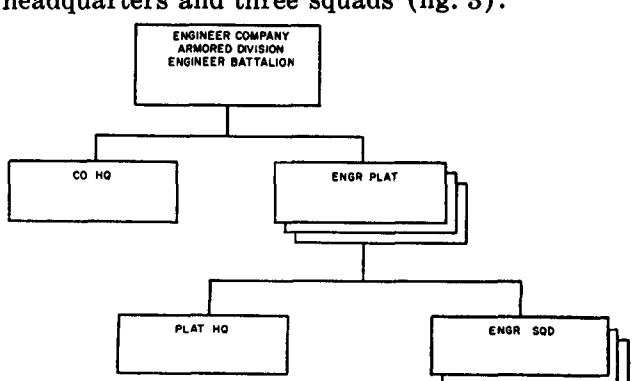


Figure 3. Organization of the engineer company, amored division engineer battalion.

10. Equipment of Armored Engineer Company

The company is one hundred percent mobile with organic vehicles. Major items of equipment in the armored engineer company are shown in TOE 5–215. The company also has many items of administrative, operational, and housekeeping equipment.

Section II. COMPANY HEADQUARTERS

11. Mission

The administrative echelon consists of the company clerk and the mess, supply, and equipment and maintenance sections. Command is not limited to physical leadership and direction. It includes planning; it also includes responsibility for the appearance, conduct, and discipline of the men, and safeguarding their health, welfare, and morale.

12. Organization

Company headquarters is formed into a command echelon and an administrative echelon.

Section III. COMMAND ECHELON

13. Organization

The command echelon of company headquarters consists of the command section and the communication section.

14. Command Section

a. The command section consists of the company commander, the executive officer, and the first sergeant.

b. The company commander is responsible to the battalion commander for the administration, training, discipline, supply, appearance, and operations of his company. His specific duties include—

(1) Aiding the battalion commander and staff in developing plans for the employment of his company. When his company is attached to or in support of a combat command, the company commander similarly assists the combat commander and his staff, by maintaining close liaison with them, keeping them informed of the situation in his company, and recommending the use to be made of his company in order that it may most effectively assist the mission of the combat command.

(2) Exercising initiative to keep his company usefully employed when no company missions are assigned.

(3) Analyzing a task, dividing it into its components, and allotting work to his subordinate commanders.

(4) Supervising work to see that: tasks are performed properly; correct methods are used; time schedules are met; supply of materials is maintained; difficulties are anticipated and provided for; platoon commanders are given all possible facilities, including personnel and equipment from company headquarters or battalion, to help them execute their assigned work.

(5) Inspecting to insure that tools, equipment, weapons, transportation, and all classes of supply are properly maintained, used, or stored, and that the mess, supply, communication, administration, and maintenance sections are operating properly.

(6) Conducting continuous engineer reconnaissance, and reporting appropriate information to battalion headquarters and to the unit supported.

c. The executive officer, usually the senior lieutenant in the company, is second in command. He assists the company commander in the performance of his duties, makes recommendations on company matters, and assumes command in the company commander's absence. The executive officer must keep constantly informed of the situation, be familiar with the policies of the company commander, and be empowered to make decisions in his name. He may be used as the project engineer on a job requiring two platoons, either simultaneously or on a two-shift basis, to coordinate the work and preserve continuity of effort. He can be designated as a company liaison officer, when required, or as the assistant unit engineer for a unit to which the engineer company or a major fraction thereof is attached. Mess, supply, and transportation are also supervisory responsibilities of the executive officer.

d. The first sergeant is selected by the company commander as prescribed by current Army Regulations. The first sergeant is the principal enlisted assistant to the company commander. He

coordinates such company activities as mess, supply, transportation, maintenance, and communication. He helps prepare and maintain records, rosters, correspondence, and reports. He acts as a representative between the company commander and the enlisted men of the company. As a construction foreman, he aids the company commander in inspecting and supervising training and operations. In the absence of all company officers, the first sergeant assumes the duties of the company commander.

c. The command section provides leadership and direction for the communication section, administrative echelon, and platoons not detached from the company. When the company is divided for nontactical reasons, company headquarters normally is located with the most centrally located platoon, or with a two-platoon grouping, if one exists.

15. Communication Section

a. Organization. The communication section consists of a communications chief, radio operators, a radio mechanic, and a driver.

b. Employment and Operations. The section chief is responsible to the company commander for the technical performance and military control of his men. He supervises the operation of the company message center, and insures that messages are sent and received promptly and accurately. The communication section is always employed as part of the command echelon of company headquarters. It provides radio service when required, and may also provide telephone

service. Radio service includes operation of one radio in the battalion or combat command net, and one radio as a control station in the company net. Telephone service includes operating telephones at company headquarters and providing wiring to the platoon headquarters when the situation requires or permits. Wire from battalion headquarters is provided by the battalion headquarters communication section.

Section IV. ADMINISTRATION ECHELON

16. Organization

The administrative echelon consists of the company clerk, the mess, supply, and the equipment and maintenance sections. It is commanded by the senior officer or NCO present in the echelon.

17. Administration Section

The company clerk is the administrative assistant to the unit commander. He performs various clerical and typing duties at the company level.

18. Mess Section

a. Organization. The mess section consists of a mess steward, first cooks, cooks, and a cook's helper.

b. Operation and Employment. The mess steward and cooks are responsible for preparing and serving meals for the company. Ordinarily, the cooks are divided into two shifts which alternate every 24 hours, usually after the noon meal. Sometimes the mess section may have to prepare meals on the move or at several different locations.

Men may have to be fed to accommodate around-the-clock work schedules, with many of the meals being served at the work site. The water trailer is kept at the kitchen to supply water for cooking and other mess operations. It may also be used to augment the water in organic water cans.

19. Supply Section

a. Organization. The supply section consists of a supply sergeant and an armorer.

b. Operations and Employment. The supply section prepares requisitions, reports of surveys, and other forms related to the receipt, storage, and issue of supplies. The supply sergeant is responsible for keeping the company property books and for the general condition of the supply room. The section is also responsible for the repair of weapons and the salvage of unserviceable property. Weapons are repaired and serviced by the armorer. Weapons needing major repairs are sent through the battalion supply section to the appropriate ordnance shops. Except for rations and petroleum products, the company supply section procures supplies from the battalion supply section and reissues them directly to the using unit or individual. Rations are normally issued by the battalion supply section directly to the mess section; petroleum products directly to the equipment and maintenance section. When the company is attached to a higher headquarters, supplies other than engineer items are issued by that headquarters.

20. Equipment and Maintenance Section

a. Organization. The equipment and maintenance section consists of a motor sergeant, tractor operators, an air compressor operator, an engineer equipment mechanic, a personnel carrier driver, tracked vehicle mechanics, a wrecker operator, a wheeled vehicle mechanic and mechanics' helpers.

b. Operation and Employment.

(1) The motor sergeant is responsible for the inspection of vehicles and equipment. He supervises preventive and organizational maintenance and keeps maintenance rosters. He is responsible for the proper care and use of supplies in the motor pool. Assisting him are the mechanics of his section.

(2) The equipment and maintenance section operates with the company rear echelon. Its functions are: to keep company vehicles and equipment operating, and to furnish equipment support for the company construction effort. The section draws gasoline, oil, and lubricants from battalion supply and makes necessary issues to company vehicles. Under the supervision of the company motor officer (executive officer), the section assists in training drivers and performs vehicle inspections.

Section V. PLATOON

21. Mission

The platoon is the main operational component of the company, but it is not equipped to provide its own administration and supply. It performs pioneering and combat missions in support of other arms and services within the division. With additional equipment, the scope of platoon operations can be greatly increased. In a large-scale operation, the platoon functions as part of the company. In all operations, the platoon headquarters acts as a coordinating and supervising agency for the squads.

22. Organization

The platoon consists of a platoon headquarters and three squads. The platoon headquarters comprises the platoon leader, the platoon sergeant, a combat vehicle commander, a combat vehicle driver, demolition specialist, a combat vehicle crewman, light truck drivers, and a toolroom keeper.

23. Operations

a. The platoon leader commands the platoon. He is responsible for the state of training of the platoon, and for the proper performance of the tasks assigned to it. He is also responsible for the discipline, appearance, and welfare of the men in his platoon. He is assisted by the platoon sergeant.

b. The platoon leader analyses the tasks given to the platoon, and then assigns the work to his

subordinates. The efficiency of the platoon depends to a large extent upon the proper assignment of tasks to squads and individuals. In assigning tasks, the platoon leader preserves the integrity of the platoon and squads as much as possible.

c. The platoon accomplishes most when it operates as a unit, under the control of the platoon leader. Since the platoon is not administratively self-sufficient, and has no heavy construction equipment, it functions best when employed as a unit of the parent company. When two platoons are employed together, they work under company supervision; one platoon is not attached to another.

24. Employment

a. When centralized control, reinforcement, and logistical support from the parent unit are practicable, direct support is the normal method for employing engineer troops. Engineers are attached only when distance, terrain, and control of the mission by the parent engineer unit is impractical and undesirable.

b. The engineer platoon can normally provide adequate engineer support for a battalion task force by utilizing organic tools and equipment and expedient means to overcome obstacles to movement of armor.

Section VI. SQUAD

25. Mission

The squad is the basic unit of the platoon. Working as a team, it helps to perform the mis-

sions assigned to the platoon. The squad can work independently only for short periods of time. When the company or platoon is working as a unit, tasks are assigned to each squad.

26. Organization

The squad consists of a squad leader (combat construction foreman), an assistant squad leader, combat construction specialists, demolition specialists, pioneers, and a personnel carrier driver.

27. Operations

Operations of the squad are controlled by the squad leader. He is responsible to the platoon leader for accomplishing tasks assigned to the squad. The squad works as a team with individual members performing the required tasks. However, when possible, the specialties of the individuals should be utilized.

28. Employment

The squad is not normally employed away from its platoon. There may be times, however, when squads are given independent missions, such as a mine clearing detail for division headquarters or for a special armored task force operating alone. In some of these situations it may be desirable to attach the squad to the supported unit. Flexibility is the keynote of employment of any size armored engineer unit.

Section VII. EMPLOYMENT AND OPERATIONS

29. Employment

a. The company normally supports a committed combat command. The specific engineer support provided the combat command is based on the tactical situation, the anticipated engineer work to be accomplished during the operation, and the number and types of engineer units available.

b. A combat command normally is composed of two or more battalion task forces which, when committed, require engineer support. To accomplish this one engineer platoon may be attached to, or placed in support of, each leading battalion task force. The platoon usually takes one bridge section from the bridge company. In order to have equipment available for short, fixed span bridging missions, specific bridge requirements are indicated by operational planning.

c. The basic mission of all engineer units is to serve the commander with which they are associated. This may be attained by general support, direct support, or attachment. The details of engineer relations to other arms are explained in chapter 2 of FM 5–6.

d. While the company is trained to operate as a unit, the squads and platoons are able to work alone with only nominal control by the company headquarters.

30. Operations

a. Construction. The company can construct, maintain, and repair small buildings, roads, bridges, culverts, fords, and landing fields for

small aircraft. It can install minefields and construct obstacles. When reinforced with additional heavy engineer equipment, the company can also accomplish heavy construction tasks.

b. Demolitions. The company can carry out an extensive demolition program as directed by the combat command commander. Items which may be prepared for demolition include buildings, bridges, culverts, water works, power stations, supplies, railroad facilities, disabled vehicles or aircraft, and obstacles.

c. Reconnaissance. The company commander directs general engineer reconnaissance continually and as specified by the battalion commander. Reconnaissance patrols are operated for the armored division engineer battalion or the supported units, as required. Frequently reconnaissance is made to secure detailed information on a specific subject for a special purpose. Reconnaissance patrols consist of platoons, squads, or selected groups of men under company officers or noncommissioned officers, depending upon the mission to be accomplished. Before making his plans for any important mission, the company commander ordinarily makes a personal reconnaissance.

31. Security

a. The company commander is responsible for the security of his company at all times. Maximum security benefit should be derived from proximity to other troops but this does not relieve the company commander of his responsibility for the security of his company. After making a

personal reconnaissance, he normally assigns the security missions to one of the platoons. The size of the security detachment depends upon the terrain, the probability of attack, and the strength and proximity of the enemy. Under certain circumstances, security can best be provided by motorized patrols. When these are used, one platoon is designated as a "ready platoon" which can move out prepared to fight at a moment's notice.

b. The company may be assigned the mission of providing security for the armored division engineer battalion. The advance guard for a battalion move is normally a full company. A company commander with the mission of providing flank or rear security to a marching battalion, or security for a battalion bivouac, normally details one platoon to provide the security force.

CHAPTER 3
BRIDGE COMPANY

Section I. GENERAL

32. Mission

The bridge company provides personnel and equipment to transport, maintain, and to furnish technical assistance in the erection of the tactical stream-crossing equipment of the armored division engineer battalion. In an emergency, the bridge company can construct bridges or rafts with its own personnel, although at a reduced rate. The company may also perform the maintenance required to keep a bridge in operation. Individuals of this unit can fight as infantrymen when required. The unit has the capability of defending itself and its installations against hostile ground attack.

33. Organization

The bridge company is organized with a company headquarters and three identical bridge platoons. Each platoon consists of a platoon headquarters and two identical bridge sections (fig. 4).

34. Equipment

a. Bridge, Floating, Aluminum, Highway Type, Deck Balk Superstructure on Pneumatic Floats. The bridge company is completely mobile. The organic transportation includes 5-ton military

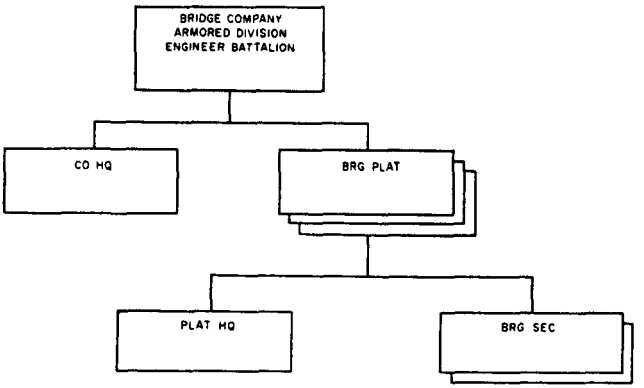


Figure 4. Organization of the bridge company, Armored Division Engineer Battalion.

bridge trucks and other type vehicles and equipment. There are three sets of Bridge, Floating, Aluminum, Highway Type, Deck Balk Superstructure on Pneumatic Floats, each providing 141 feet 8 inches of class 50 floating bridge. Information on other river crossing means is found in FM's 5–132 and 31–60. For additional references, see appendix I. Bridge components of one set provide any one of the following:

(1) One 141-foot 8-inch floating bridge.
(2) Two 4-float rafts (class 50 at 7 fps).
(3) One 5-float reinforced raft (class 60).
(4) Two 75-foot floating bridges.
(5) Three short span fixed bridges.
(6) The use of two or more bridge sets together for longer bridges or for bridges of increased capacity.

b. Boat Assault, Plastic, 16-Foot, T3. This boat is intended for use in carrying foot troops in a stream crossing but not as a support for a raft or

bridge. The boat weighs 291 pounds and can be carried by 6 to 10 men. It has a flat bottom, a tapered bow, and a square stern which is reinforced to accommodate a 25- to 30-hosepower motor.

c. Bridge Erection Boat, 27-foot. The 27-foot bridge erection boat has sufficient power to propel the heaviest types of floating bridge rafts. It is also used for general utility work during bridge construction, and for installing anchorage systems. There are two 27-foot bridge erection boats in each bridge platoon, or a total of six in the bridge company. Powered by twin gasoline-powered engines, the boat has a two-section aluminum alloy hull, consisting of a bow cargo-carrying section and a stern section containing the operator's cockpit with the operating controls. The two sections are quickly and easily connected and can be readily disengaged for transport. The bow section is carried on a standard two-wheel, pole-type, 2½ ton utility trailer towed by a 2½ ton truck. The stern section is carried on the truck body. During transport, each section rests on a special hull-fitting cradle to prevent damage.

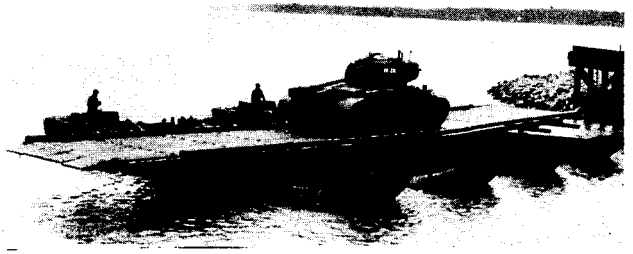


Figure 5. Boat bridge erection gas aluminum twin screw 2 section 27 foot.

The sections are loaded and unloaded by a truck crane (figs. 5, 6, and 7).

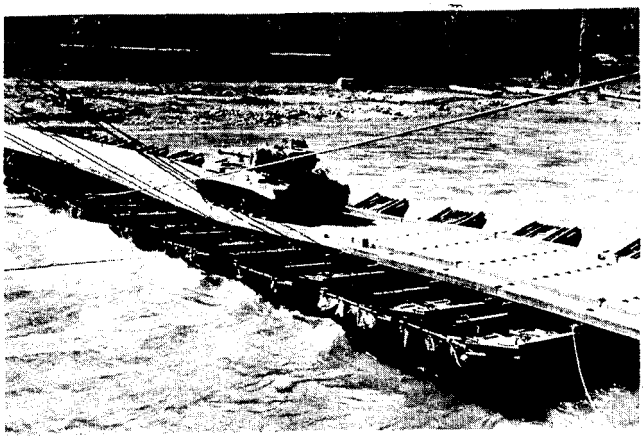


Figure 6. Bridge, floating, aluminum highway type deck bulk superstructure on pneumatic floats.

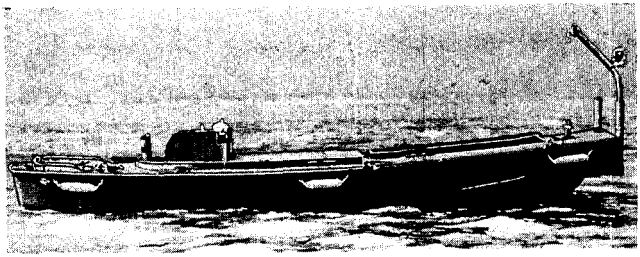


Figure 7. Four float raft, normal.

Section II. BRIDGE COMPANY HEADQUARTERS

35. Mission

The mission of the bridge company headquarters is to provide command, planning, administration, limited labor and equipment support for the three bridge platoons.

36. Organization

The company headquarters is divided into command and administrative echelons. This grouping, however, is merely to facilitate control of headquarters personnel, since the bridge company seldom employs forward and rear command posts.

Section III. COMMAND ECHELON

37. Organization

The command echelon of company headquarters contains the command section and the communications section.

38. Command Section

a. The command section consists of the company commander, the executive officer, first sergeant, and drivers.

b. The company commander, executive officer, and first sergeant have the same general duties as the officers and first sergeant of a lettered company. In addition, they inspect and dispatch vehicles with special bridge loads, and serve as consultants in the planning and erection of tactical bridging. These duties require training in specialized bridge vehicles and a thorough knowledge of bridge capacity, layout, construction, parts requirements, and truck-loading plans.

39. Communications Section

a. The communications section consists of intermediate speed radio operators and a radio mechanic.

b. Typical operations and duties of personnel are generally the same as those for a lettered company.

Section IV. ADMINISTRATIVE ECHELON

40. Organization

The administrative echelon of company headquarters consists of the administrative, mess, supply, and equipment and maintenance sections.

41. Employment and Operations

a. The employment and operations of the administrative, mess, and supply sections, and the duties of personnel, are similar to those shown in chapter 2 for comparable sections in the lettered company.

b. Operations of the equipment and maintenance section are similar to those of the same section in a lettered company, except that the mechanics also repair bridge equipment. Equipment in the bridge company is used primarily in bridge construction. Close liaison is required between the bridge company maintenance section and the battalion maintenance section to obtain the proper balance in the use of men and equipment, and to secure necessary repair parts and supplies.

Section V. BRIDGE PLATOON

42. Mission

The bridge platoon provides bridging equipment, and technical assistance in bridge construc-

tion, to the engineer combat companies. Its flexible organization permits placing the desired amount and type of bridge equipment with each force the division may commit in an operation.

43. Organization

The bridge platoon consists of a platoon headquarters and two bridge sections. Platoon headquarters includes a platoon leader, a platoon sergeant, bridge specialists, and a radiotelephone operator.

44. Employment and Operations

a. General.

(1) The bridge platoon is directed and supervised by the platoon leader who is assisted by the platoon sergeant. The platoon leader makes engineer reconnaissance, particularly bridge reconnaissance, and assists the bridge company commander in preparing plans for the employment of the platoon. The bridge platoon leader normally provides technical assistance to the constructing troops. In some cases, the platoon leader will actually direct and supervise the construction of the bridge, particularly when only bridge platoon personnel are involved in the construction.

(2) The bridge platoon may be employed in part or as a unit with one of the armored engineer companies with a combat command. Occasionally, when the division

is crossing at a single-crossing site, the platoon may be employed as a part of the bridge company. When the platoon or any portion of it is detailed from the bridge company, it is ordinarily attached to one of the lettered companies of the engineer battalion. The full platoon, when detailed from the bridge company, is usually supported by heavy equipment from company headquarters.

b. River-Crossing Operations.

(1) In hasty river crossings, the engineer battalion and bridge company headquarters usually are not close enough to provide help in the limited time available. Planning, supplying, and manning the engineer portion of the crossing must be done by the bridge platoon, and by the engineer company present with the combat command. A platoon leader from the engineer company does the bulk of the reconnaissance and bridge planning, and then supervises the operations of the section.

(2) The bulk of the bridging supply for a deliberate river crossing is normally provided by corps engineers, allowing the organic bridge to advance with the armored division, thus providing equipment for the gaps and short spans of demolished bridges which will be encountered after the crossing. If the division bridging equipment is used in a

deliberate crossing, the platoon functions under the direct control of the company.

45. Bridge Section

a. General. Each of the bridge sections consists of a bridge section sergeant, bridge specialists, and bridge helpers.

b. Equipment. Each bridge section has six 5-ton military bridge trucks used to transport components of the bridge set. Although the bridge, floating, aluminum highway type, deck balk superstructure on pneumatic floats is carried in TOE under platoon headquarters, it is broken down into one of four type loadings and carried by the bridge sections. These loadings are: normal bay load, erection tool load, section load, and raft load.

c. Employment. A bridge section in support of an armor unit may be employed as a section, as any part of a section, or as part of a bridge platoon, depending upon the type and length of bridge required.

d. Operations. A bridge section is commanded by a section sergeant. He is responsible to the platoon leader for the control and conduct of the men in his section. The section sergeant provides technical assistance in loading, constructing, and dismantling the bridge. When it becomes necessary to split the section so that small units of bridging can be constructed simultaneously a bridge specialist is placed in charge of one of the units. The bridge specialist and bridge helpers are the section truck drivers. They assist and supervise the loading and unloading of the bridge

units and the trucks, give technical advice to the installing unit, and in an emergency may erect the bridge.

46. Transportation and Loading of Bridge, Floating, Aluminum Highway Type, Deck Balk Superstructure on Pneumatic Floats

a. The components of the bridge can be carried on any of the standard military cargo trucks or trailers having a rated capacity of 2½ tons or more. However, the 5-ton, military bridge truck is normally used.

b. Twelve 5-ton military bridge trucks transport all of the components of one bridge. Nine 5-ton military bridge trucks can carry all of the balk, floats, and saddles. Three additional trucks can carry all of the additional miscellaneous equipment. Loading plans vary with the mission of the company, platoon, or section. Plans are designed to most efficiently and quickly assemble the desired floating bridge, fixed span, or raft required (fig. 8).

c. The floating bridge equipment is used to assemble floating bridges, fixed bridges, and rafts. In general terms, the floating bridge consists of a deck built of hollow aluminum sections supported on pneumatic floats.

(1) *Floating bridges.* The normal floating bridge is assembled with floats spaced 15 feet on centers, except in the end sections, which are reinforced with one extra float. The floating bridge can also be assembled as a reinforced bridge with

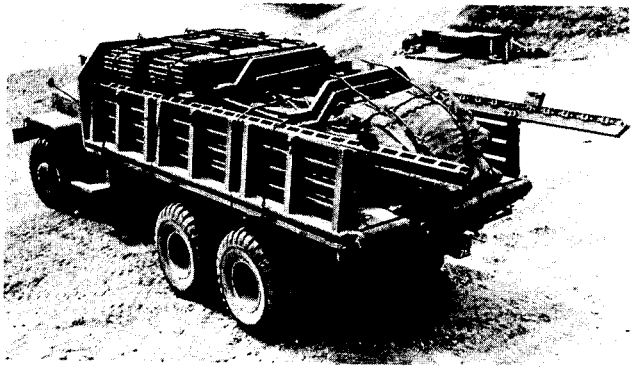


Figure 8. Five-ton military bridge truck with load.

floats on 9-foot centers. Float springs of 10, 15, 20, and 35 feet can also be used.

(2) *Fixed bridges.* The components of the floating bridge can be used to assemble fixed bridges with simple spans from 15 to 45 feet, and multiple span bridges using trestles as intermediate supports.

CHAPTER 4
HEADQUARTERS AND HEADQUARTERS COMPANY

Section I. GENERAL

47. Mission

a. Headquarters. To provide an engineer special staff section for the division, and to provide command and staff for the Armored Division Engineer Battalion.

b. Headquarters and Headquarters Company.

(1) Provide administration, communication, reconnaissance, maintenance support, supply, medical service, and supplemental heavy equipment for the Armored Division Engineer Battalion.

(2) Provide engineer class II and IV supply and engineer field maintenance support for the Armored Division.

(3) Undertake and carry out combat missions of Headquarters and Headquarters Company, Armored Infantry Battalion, when required.

48. Organization

Organization of headquarters and headquarters company consists of a company headquarters, the enlisted men who work in battalion headquarters, division engineer section, and the equipment platoon (fig. 9). The organization. duties, and training of personnel in the battalion head-

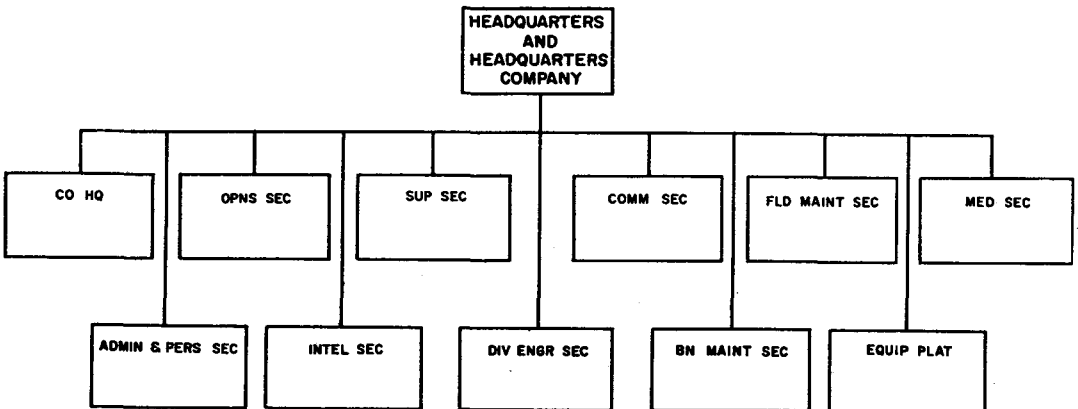


Figure 9. Organizational chart, headquarters and headquarters company, amored division engineer battalion.

quarters section and the division engineer section are covered in paragraphs 62 through 92. Company headquarters and the equipment platoon are discussed in paragraphs 49 through 61.

49. Functions

a. Headquarters and headquarters company provides the enlisted men for battalion headquarters. The company feeds, clothes, quarters, pays, and is responsible for the conduct of these men. They are assigned to battalion headquarters sections, and are under the operational control of the officer heading each section.

b. Headquarters company provides transportation and maintenance services as needed. It operates an equipment pool for the entire battalion, but does not provide battalion level supply or maintenance, since these functions are performed by the respective sections of battalion headquarters.

c. The company has a pool of construction equipment in its equipment platoon. This may be augmented with class IV equipment from supporting engineer units or army engineer depots as operational missions necessitate.

Section II. COMPANY HEADQUARTERS

50. Mission

The mission of company headquarters is to provide command and administrative services for the company; to supervise the conduct, discipline, and appearance of company personnel; and to maintain their health, welfare, and morale. Ad-

ministratively, the company feeds, clothes, supplies, quarters, pays, and provides recreational equipment for all men in battalion headquarters, in the company, and in the medical section.

51. Organization

Company headquarters is composed of a company commander, an executive officer, a first sergeant, a mess steward, a supply sergeant, first cooks, a company clerk, a radio operator, and a cook's helper. Company headquarters is organized into command and administrative echelon. Equipment and maintenance functions are discussed in paragraphs 58 through 61 and 20.

Section III. COMMAND ECHELON

52. Organization

The command echelon of headquarters company includes the company commander, executive officer, first sergeant, and a radio operator.

53. Employment and Operations

a. Administrative operations of the command section are generally the same as those of the lettered company.

b. The company commander is usually designated headquarters commandant, and as such he—

(1) Provides for the security of battalion headquarters.

(2) Supervises the physical movement of battalion headquarters, furnishing neces-

sary men and transportation from headquarters company.

(3) Supervises the headquarters mess, and the messing and quartering of casuals.

(4) Acts as headquarters billeting officer, in coordination with S1.

(5) Enforces traffic control regulations within the areas of battalion headquarters and headquarters company.

(6) Marks routes for battalion motor marches, and supervises the activities of guides and advance details.

c. The executive officer is second in command and assists the company commander in the performance of his duties, makes recommendations on company matters, and assumes command in the company commander's absence. He must be familiar with the policies of the company commander, keep constantly informed of the situation, and be empowered to make decisions in the name of the company commander. Mess, supply, transportation, and liaison with battalion staff officers are frequently responsibilities of the executive officer.

Section IV. ADMINISTRATIVE ECHELON

54. Organization

The administrative echelon of headquarters company includes the administrative, mess, and supply sections.

55. Administrative Section

The administrative section consists of a company clerk under the supervision of the first

sergeant. The company clerk performs generally the same duties as those described in paragraph 17.

56. Mess Section

In addition to the mess operations described in paragraph 18, the mess section also provides a mess for officers of battalion headquarters and casuals.

57. Supply Section

Operations of the supply section are comparable to those of the lettered company supply section.

Section V. EQUIPMENT PLATOON

58. Mission

The mission of the equipment platoon is to provide a pool of equipment, with operators, for the use of the bridge and lettered companies.

59. Organization

The equipment platoon consists of an officer (platoon leader), a construction machinery foreman, crane shovel, grader, tractor, air compressor operators, and a light truck driver.

60. Equipment

Platoon construction equipment includes angledozers, truck mounted crane shovels, a trailer to transport crane attachments, motorized road graders, and truck mounted air compressors. Five-ton truck-tractors with 25-ton lowbed semitrailers are provided for transporting the angledozer tractors.

61. Operations

a. General. Operations of the equipment platoon are directed by the platoon leader. He is assisted by a construction machinery foreman and machinery operators. The platoon leader is responsible for the inspection of the vehicles and construction equipment of headquarters company. Repair work is accomplished by the battalion maintenance section. Equipment is allotted by the battalion commander, who is guided by the recommendations of the battalion S3. Each crane, tractor, grader and air compressor is assigned two operators who provide continuous operation. One operator in each pair serves as driver when the equipment is being moved.

b. Equipment Pool.

(1) The equipment platoon operates as an equipment pool to supplement the equipment of the lettered companies.

(2) The equipment platoon has the supervisory personnel necessary to operate as an independent platoon directly under the battalion staff. When this is done, the platoon may be given additional equipment such as dump trucks, detached from lettered companies or the supply section.

(3) Headquarters company trains the operators and the battalion maintenance section maintains the equipment. The using company directs the use of the equipment unless the platoon is operating directly under S3.

c. Maintenance. The equipment platoon has no mechanics in its organization. The battalion maintenance section is charged with the maintenance of the construction equipment and vehicles of headquarters company, including those assigned to sections of battalion headquarters, medical section, and equipment pool.

d. Security. The equipment pool must be guarded at all times. This may be accomplished in rear areas by using inclosed equipment parks, with a guard to check vehicles in and out through a single gate, plus a system of interior guards. In forward areas and wooded terrain use is made of defilade, dispersion, and camouflage, as well as the security afforded by the use of men and weapons. All personnel must be alert to detect and prevent pilfering and sabotage.

CHAPTER 5
BATTALION HEADQUARTERS

Section I. GENERAL

62. Mission

The mission of the battalion headquarters is to provide an engineer special staff section for the division and to provide command and staff for the armored division engineer battalion.

63. Organization

Battalion headquarters consists of the battalion commander who is also the division engineer, the assistant division engineer, the executive officer, the battalion S1, S2, S3, and S4, a chaplain, a communications officer, a general duty medical officer, a motor officer, and a field maintenance officer. Although these officers comprise the battalion staff they actively supervise their respective operating sections (fig. 10). The duties of enlisted men working in battalion headquarters are presented with the discussion of their assigned staff sections, although administratively they are a part of the headquarters and headquarters company.

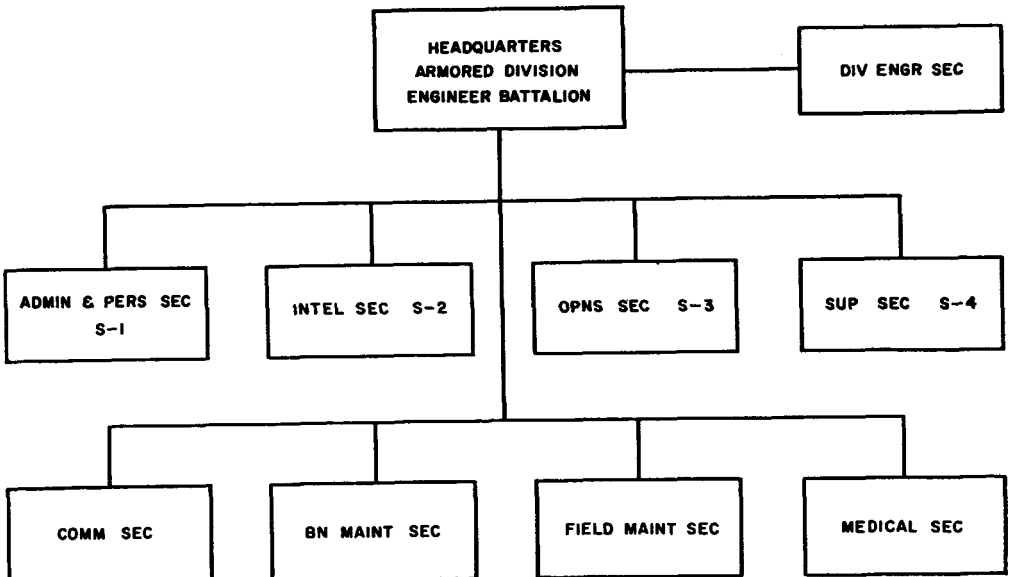


Figure 10. Organization of battalion headquarters, armored division engineer battalion.

Section II. COMMAND ELEMENT

64. Organization

The battalion commander and executive officer comprise the command element in the battalion headquarters.

65. Duties of Personnel

a. The battalion commander has two primary responsibilities: command of the armored division engineer battalion and membership on the division commander's special staff as division engineer. Each duty involves separate, distinct, and different responsibilities. Both his command and staff duties, however, are directed toward implementing the armored division engineer battalion capabilities listed in paragraph 7 to insure maximum effectiveness of engineer support to the division.

(1) As battalion commander, he directs, controls, and supervises the activities of all organic and attached engineer troops and their equipment. He is responsible for the preparation of plans, policies, and orders. He visits and inspects his troops and their activities, and conducts personal reconnaissance.

(2) As division engineer, he acts as advisor to the division commander and staff, and keeps them informed of the engineer situation. He helps prepare division plans, policies, and orders; determines requirements of engineer supplies for nonengineer units of the division; main-

tains close liaison with the division artillery commander and the combat command commanders to anticipate their engineer needs; makes recommendations for the engineer support required from corps; and coordinates planning with the corps engineer. Although the division engineer is not under the command of the corps engineer, technical channels are normally observed.

(3) When the use of atomic weapons is contemplated, the engineer should participate in the preliminary planning conferences in which ways and means are determined to carry out the commanding general's plan. The engineer may be called upon to present reasons for the selection or elimination of specific targets. He may be detailed to assist in weapon analysis of proposed targets and to make recommendations concerning:

(*a*) Quantity, type, and yield of weapons.

(*b*) Height or depth of burst.

(*c*) Work times and distance factors.

(*d*) Desired emplacement site location.

(*e*) On-call detonation or times of burst.

(*f*) Troop and civilian safety precautions.

(*g*) Engineer effort required to pass the division through an area subjected to friendly atomic attack.

(4) Upon the commander's decision to employ a prepositioned atomic weapon in a general locality, the engineer will be re-

sponsible for designating the emplacement and for emplacing and firing of the weapon. Responsibility for the coordination of the supply and movement of equipment, materials, and personnel to support a prepositioned atomic demolition mission may be assigned to the engineer.

(5) The division engineer must adopt a method of operation that permits him to perform his duties properly from two different places. To assist him in his dual role, he has his executive officer and staff at battalion headquarters, and the assistant division engineer (ADE) section at division headquarters.

b. The executive officer is second in command of the battalion. He is responsible for the work of the staff, and controls and coordinates staff and field operation in accordance with the policies of the commanding officer. The executive officer keeps informed of the battalion and division situation, and when possible, assists the battalion commander in his functions as division engineer. He usually remains at battalion headquarters when the commanding officer is absent.

Section III. DIVISION ENGINEER SECTION

66. Organization

The engineer section of the division staff is supervised by the battalion commander and consists of the assistant division engineer (ADE), a combat construction foreman, a construction

draftsman, a radio operator, and a light truck driver.

67. Duties of ADE and Section Personnel

The assistant division engineer represents the division engineer on the division staff. He must be familiar with all the activities of the division and the engineer battalion. An up-to-date situation map containing all available engineer information is maintained by his section at the division main command post. Under the direction of the division engineer, the assistant division engineer acts as consulting engineer to the division staff sections in the preparation of plans involving engineer work. In general, the assistant division engineer relieves the battalion commander of many of his routine duties at division headquarters, so that he is free to devote much of his effort to commanding the engineer battalion.

68. Operations

The engineer section at division headquarters is primarily a special staff section. Ordinarily, it operates at the division main command post. Through the battalion radio net, the section can contact battalion headquarters or any of the companies.

Section IV. ADMINISTRATIVE SECTION

69. Organization of Administrative and Personnel Section

The administrative and personnel section consists of those individuals required to provide

second echelon personnel support for all elements of the battalion; and those additional personnel normally engaged in other administrative type duties. Overall supervision of this section is exercised by the adjutant (S1). Activities of the personnel section within the administrative and personnel section are supervised by the unit personnel officer (warrant officer).

70. Duties of Key Personnel

a. The adjutant (S1) operates at battalion headquarters. He is responsible to the battalion commander for all personnel and administrative actions of the battalion. His duties are prescribed in FM 5–5 and FM 101–5, and include—

(1) Personnel management and record keeping with respect to classification, assignment, pay, promotion, reduction, transfer, retirement, and discharge of battalion personnel.
(2) Processing awards of decorations, citations, commendations, and other honors.
(3) Processing applications for leaves.
(4) Maintaining records of military justice procedures.
(5) Maintaining reports of strength, casualties, prisoners of war, and personnel statistics.
(6) Reception of replacements, and their processing to include assignment and quartering.
(7) Movement, internal arrangement, internal organization, and internal operation of battalion headquarters.

(8) Providing morale, welfare, and recreational services.
(9) Maintaining the unit journal.
(10) Operating the unit postal service.
(11) Troop information and education officer.

b. The military personnel warrant officer assists the adjutant in personnel matters. He directs the activities of the personnel sergeant, the personnel specialists, and the clerks in the personnel subsection. His duties are prescribed in FM 101–5.

71. Chaplain

The chaplain provides spiritual guidance for the battalion; advises the battalion commander on matters pertaining to religion and morality and character guidance; and counsels the individual soldier in his personal problems. The chaplain's assistant assists the chaplain in preparation for religious services; performs routine administrative duties under the supervision of the chaplain; and, as an additional duty, serves as light truck driver. He assists in conduct of character guidance instruction to include operation of training aid devices.

Section V. INTELLIGENCE SECTION

72. Organization

The intelligence section is supervised by the intelligence officer (S2) and consists of reconnaissance officers, intelligence sergeant, reconnaissance sergeants, a radio teletype team chief, clerk-typist, draftsman, intermediate speed radio operators, map distributor, still photographer, radio teletype operators, and a personnel carrier driver.

73. Duties of Key Personnel

a. The intelligence officer (S2) directs the activities of the intelligence section and is also the camouflage officer. His section acts as an agency for G2 in the division information collection plan since while seeking specific technical information, engineers may also uncover valuable tactical information. Likewise, G2 normally sends any engineer data gathered by other agencies to S2. (See FM 101–5 for the general duties of an intelligence officer.) The battalion intelligence officer—

(1) Collects and evaluates engineer information and furnishes and disseminates engineer intelligence; coordinates, with S3 and other staff officers, the assignment of missions to the reconnaissance team, and requests reconnaissance patrols from lettered companies as required. S2 must conserve the effort of reconnaissance agencies by specifying which information is of special importance during a stated period, and by issuing definite reconnaissance instructions.

(2) Keeps engineer intelligence records, including the S2 journal, the S2 work sheets, and the S2 situation map. The *S2 Journal* contains briefs of important written and oral messages received and sent, as well as notations of periodic reports, orders, and records pertaining to the intelligence section. Items are entered in chronological order and become

a permanent record. The *S2 work sheet* is a systematic arrangement of engineer information received by the intelligence section, with all items on a particular subject grouped together for ready reference and comparison. The work sheet is not a permanent record. It must be kept up to date by prompt insertions, and by removing or striking out items that become obsolete. The *engineer intelligence situation map* is kept by the S2 in collecting and evaluating engineer information and intelligence. This map shows the result of reconnaissance, classification of roads and bridges, potential water-supply sites, sources of local materials, minefield information, results of enemy action, disposition of major enemy units, and other items of engineer intelligence.

(3) Supervises intelligence training. S2 is responsible for training his own intelligence section and for supervising engineer reconnaissance training. He assists the S3 in supervising the intelligence training of all battalion personnel. Training must be carefully planned and supervised so that engineer troops know the scope and purpose of engineer reconnaissance and fully understand the impor ance of accurate reconnaissance reports.

(4) Conducts combat intelligence and counterintelligence activities. The S2 staff

responsibility for the planning and execution of combat intelligence and counterintelligence activities in the battalion, including security operations. For example, in cooperation with S1, he is responsible for censorship of postal matter and security requirements for handling messages. He questions captured enemy personnel and examines captured documents, civilians, and material of immediate importance to the unit.

(5) Procures and distributes maps, photomaps, and other engineer intelligence materials in accordance with general policies established by the division G2 and the corps engineer.

(6) Assists the battalion commander in carrying out his division engineer functions by furnishing him with detailed information on which to base his recommendations to the division commander.

(7) Coordinates with S3, on battalion psychological warfare operations and training, and defense against enemy propaganda.

(8) Prepares terrain analyses and studies for battalion use, and terrain studies for division use.

b. The three reconnaissance officers exercise immediate supervision over the reconnaissance teams. The reconnaissance missions are assigned and coordinated by S2. Reconnaissance officers lead, instruct, and dispatch the reconnaissance teams and personally participate in the more im-

portant missions. The engineer reconnaissance sergeant and the radio operator, who also drives the ¼-ton truck, must be able to take over each others duties in the event of casualties. Reconnaissance personnel use light aircraft for reconnaissance missions when required. Air reconnaissance is not a substitute for ground reconnaissance. Instead it is best used as a preliminary method to reduce the area assigned for a detailed ground reconnaissance by eliminating areas which are not of interest. Light aircraft within the divisions are normally made available to the engineers as required. Typical missions for the use of light aircraft by the reconnaissance teams are—

(1) Preliminary reconnaissance of roads, railroads, routes, and bridges.
(2) Locating sites for water points.
(3) Locating engineer material in specified areas.
(4) Checking camouflage security.
(5) Locating enemy obstacles.
(6) Locating desirable airfield sites.
(7) Locating desirable river crossing sites.
(8) Performing photographic missions.
(9) Locating suitable bivouac areas.
(10) Observing roads and terrain ahead of a march column.

c. The intelligence sergeant is the senior enlisted member of the section and assists the intelligence officer by keeping the intelligence map up to date, preparing reports and records, instructing patrol and reconnaissance parties,

preparing correspondence, and performing other intelligence functions.

d. The map distributor receives or picks up maps for division operations from the corps map depot operated by the map distribution section of the engineer topographic company, corps. Initial issue of maps for division operations is allotted by army or higher headquarters and made available to the division through the corps map depot. When a bulk shipment of maps is ready for the division, the corps map-distribution section makes delivery or, more frequently, notifies the engineer battalion S2, who dispatches the map distributor to make the pickup. He then breaks down the maps in accordance with the policies established in the division standing operating procedure. He notifies the major commands and separate units who pick up their own maps and make further distribution. The map distributor may distribute the maps if there is transportation available. The breakdown and limited storage is made in a tent or small permanent type building if available. He keeps a small reserve of maps available for emergency use and requisitions small amounts of maps through the corps engineer, as required. Maps issued and in the hands of troops have no salvage value. Maps of an area no longer required for coverage and still in the original package are returned to the map distributor who, in turn, returns them to the corps map-distribution section. Even though the table of organization and equipment shows the map distributor in the S2 section, the division engineer may find it more desirable to put him under the assistant division engineer

at division headquarters, where his map supply point will always be more centrally located and more accessible to division headquarters and divisional units.

Section VI. OPERATIONS SECTION

74. Organization

The operation section is supervised by the operations officer (S3) and consists of the assistant operations officer, an operations sergeant, various specialists, and administrative personnel. The specialists include construction draftsman, construction surveyor, and intermediate speed radio operators. The administrative personnel include a clerk-typist and a personnel carrier driver.

75. Duties of Key Personnel

a. The operations officer (S3) directs and supervises the operations section. He is also the battalion chemical, biological, and radiological (CBR) officer. His general duties as operations and training officer are prescribed in FM 101–5. Typical duties are to—

(1) Plan and supervise battalion training.

(2) Plan the allocation of engineer troops and construction equipment to various tasks, and prepare battalion operation orders. He coordinates his plans with other staff officers and where required, with other unit commanders.

(3) Keep the engineer operations and situation map current, with information furnished by tactical orders, reports

from subordinate units, and personal reconnaissance. The situation map shows all the operational information, such as engineer troop dispositions, projects under way, location of friendly major tactical units, area responsibilities assigned to subordinate units, water points, and support being rendered by other engineer troops. The S3 situation map enables all engineer staff officers to keep informed of the situation so that they may plan their operations to meet any foreseeable contingency.

(4) Utilize his assistants to make technical reconnaissance, designs, and plans for accomplishing engineer tasks.

(5) Conduct training, inspect chemical equipment, and supervise chemical, bacteriological, and radiological (CBR) activities of his battalion.

(6) Recommend any special security measures for battalion headquarters to the headquarters commandant.

(7) Recommend, when necessary, that requests be made for support by additional engineer troops, or that higher headquarters assume responsibility for engineer work in a portion of the division area.

(8) Plan, in conjunction with the S2 section, the assignment of reconnaissance missions to the lettered companies.

(9) Arrange details for movement of the battalion under tactical conditions.

(10) Make a continuing estimate of the situation so that he can make recommendations at any time for the employment of the battalion.
(11) Prepare tactical and technical reports.
(12) Coordinate liaison with supporting engineer units.
(13) Assist the battalion commander in the preparation of command reports.
(14) Assist the division staff in atomic target analysis and selection.

b. The operations sergeant is the senior enlisted man in the section. He helps the operations officer in performing his duties and in supervising section activities.

c. The combat construction specialist inspects battalion construction projects, makes recommendations, and assists in carpentry problems. He helps S3 in drawing up plans and bills of materials. He instructs in battalion-conducted carpentry schools and on special occasions performs carpentry work. He receives additional training in chemical, biological, and radiological (CBR) defense; he then assists the operations officer in training, and in supervising battalion CBR activities and equipment.

Section VII. BATTALION SUPPLY SECTION

76. Organization

a. The supply section is supervised by the logistics officer (S4) and consists of a supply warrant officer, a battalion supply sergeant, a chief supply sergeant, a radio teletype team chief,

a water supply foreman, a senior supply specialist, a supply specialist, a clerk-typist, heavy truck drivers, an intermediate speed radio operator, radio teletype operators, senior water supply specialists, supply specialists, light truck drivers, supply clerks, water supply specialists, and water supply helpers.

b. The supply section is divided into four subsections: administrative, division engineer supply, battalion supply, and water supply.

77. Administrative Subsection

a. Organization. The administrative subsection consists of a supply warrant officer, a battalion supply sergeant, a clerk-typist, and light truck drivers.

b. Duties of Personnel.

(1) The logistics staff officer (S4) performs those staff functions related to supply, transportation, evacuation, and treatment of personnel casualties, maintenance and services for the battalion (FM 101–5, par. 51). In addition he serves as the division engineer supply officer. The S4—

(*a*) In cooperation with S2 and S3, studies and collects information on available local resources, captured enemy engineer supplies, and stocks in local depots under unit control.

(*b*) Advises the battalion commander as to the availability of equipment and materials, and recommends their allocation. He estimates future require-

ments, and arranges in advance for using units to draw supplies.

(*c*) Recommends the number and location of water points. These recommendations, when approved, are incorporated in the division administrative order and the battalion operation order.

(*d*) Keeps a continuous inventory of stocks of engineer materials available, and arranges for taking over and distributing them.

(*e*) Recommends allocation of transportation (other than organic) to subordinate units, in coordination with interested staff officers.

(*f*) Supervises the procurement of all classes of supply for the battalion, and of engineer supplies for the division.

(*g*) Prepares reports as directed.

(*h*) Assists company commanders with the training of their supply personnel.

(2) The supply warrant officer assists the logistics officer in his duties. He supervises the activities of the subsections to insure an even flow of supplies, and sees that supply records are kept correctly and up to date. He is also the battalion food supervisor. As such he is responsible for procuring and distributing food for the battalion, keeping battalion-level mess records, and inspecting all company mess facilities. He has a ration breakdown sergeant in the battalion supply

subsection to assist him with these duties.

78. Division Engineer Supply Subsection

a. Organization. The division engineer supply subsection consists of a chief supply sergeant, a supply specialist, and a supply clerk.

b. Duties of Personnel. The chief supply sergeant supervises and directs the activities of the subsection. The subsection processes all requisitions and records for engineer supply for all units in or attached to the division. The subsection also supervises the distribution of engineer supplies to all divisional units except the engineer battalion. With the help of the supply specialist and clerk, the chief supply sergeant edits and consolidates engineer requisitions, keeps engineer supply records, and receives, breaks down, stores, and issues engineer supplies.

79. Battalion Supply Subsection

a. Organization. The battalion supply subsection consists of a senior supply specialist, supply specialist, and a supply clerk.

b. Duties of Personnel. The senior supply specialist directs and supervises the activities of the subsection. With the help of the supply specialist and the supply clerk, he edits and consolidates requisitions for all classes of supplies, keeps supply records, and receives, breaks down, stores, and issues all classes of supplies to the battalion. These supplies include rations, clothing and equipment, petroleum products, signal equipment, and ammunition. The section personnel also

procure, break down, and issue all rations for units within or attached to the battalion. Battalion-level mess records are kept and necessary reports are submitted as directed by the supply warrant officer.

80. Water Supply Subsection

a. Organization. The water supply subsection consists of a water supply foreman, water supply specialists, and water supply helpers. The specialists and helpers are divided into teams to operate water points.

b. Duties of Personnel. The water supply foreman directs and supervises the activities of the water supply subsection. He is responsible for the maintenance, installation, and operation of water points. He conducts reconnaissance to locate water points, and recommends schedules for drawing water. Under the supervision of the water supply foreman, the water supply specialist and the water supply helpers perform the following duties:

(1) Install and operate water points.
(2) Maintain and perform minor repairs on the water purification sets.
(3) Operate pumps, store, and dispense water.
(4) Perform tests in the field to identify and measure impurities, to determine the treatment required, to check the effectiveness of treatment, and to insure that the water issued is potable.
(5) Enforce sanitary, traffic, security, and camouflage regulations at water points.

(6) Keep water supply records and submit necessary reports.

c. Operations.

(1) The allocation of water points and the method of their employment is determined by the tactical situation. The water supply subsection operates several independent teams under the guidance of the water supply foreman. A team is dispatched by the supply officer, with the advice of the water supply foreman and the operations officer, to a particular location to supply potable water to units designated by the battalion operational plan; or a water supply team may be attached to a lettered company serving with a combat command. In this case, the water point is located by the combat command S4 on the advice of the engineer company commander or his representative, and the water supply team leader. Movement, control, and protection are responsibilities of the combat command S4. Water point locations are reported by the company commander to the combat command and to the engineer battalion headquarters. Whether sent to a specific location or attached to an engineer company, the team operates alone. Depending upon its location, the team may be attached to an adjacent unit for rations, or rations may be delivered by the armored engineer company or bat-

talion headquarters company, or prepared on small cooking units by the team.

(2) Cargo trailers from the administrative supply subsection are usually assigned to the water supply subsection, as needed. These are used to carry the water purification sets. One truck and trailer are required to transport each team and its equipment to successive sites. A reserve team is sometimes used to "leapfrog" another water point. The new water point is put into operation and the old equipment is then removed for inspection, maintenance, and repair. Additional mobility and speed in operations may be obtained by bolting parts of the purification unit to the trailer floor. This makes it unnecessary to load and unload, and to connect and disconnect, the whole set for each move.

(3) The water supply foreman, when the situation permits, will visit each water point every day to deliver supplies, food, and mail, and to help the teams with any difficulties that may arise.

Section VIII. COMMUNICATIONS SECTION

81. Organization

The battalion communications section is supervised by the communications officer and consists of a communications chief, radio teletype team chief, senior radio mechanic, intermediate speed radio operators, a personnel carrier driver, a radio

mechanic, teletype operators, a senior signal message clerk, a senior switchboard operator, message clerks, a switchboard operator, and wiremen.

82. Duties of Key Personnel

a. The communication officer directs the communication section, and as a staff officer, supervises all communication activities, and the organizational maintenance of all signal equipment in the battalion. In general, he—

(1) Advises the battalion commander and staff on correct signal communication technique.
(2) Prepares plans and supervises the establishment, operation, and maintenance of the engineer communication system.
(3) Supervises technical training of communication personnel.
(4) Offers technical advice and assistance to S4 regarding supply of signal communication materials for the battalion.
(5) Makes recommendations, in coordination with S4, for initial and successive locations of the battalion command post, when not prescribed by higher authority.
(6) Makes recommendations for procuring and replacing signal communications personnel.
(7) Establishes and operates the battalion communications center.
(8) Prepares, or secures from appropriate headquarters, orders, Standing Signal Instruction (SSI), and Signal Operation Instructions (SOI).

(9) Supervises maintenance of signal security in the battalion (coordinates with S2).

(10) Supervises care, maintenance, and repair of signal equipment within the battalion (coordinates with S4 for parts).

b. The communication chief assists the communication officer. He supervises the installation, operation, and maintenance of teletype, wire, and communication facilities; instructs and trains communication personnel in field communication techniques; and supervises teletype and radio operators is operating battalion net control.

(1) The radio teletype team chief directs and coordinates all phases of communication center operations, to insure that messages are transmitted with the utmost speed, accuracy, and security. He supervises and instructs personnel in the function of a message center and in the performance of individual assignments.

(2) He keeps necessary records pertaining to the operation of wire, radio, and message center activities.

83. Operations

The communications section operates a subordinate station in the division radio command net, which may be used as an alternate battalion net control station; operates the telephone system and message center; and performs organizational maintenance on all Signal Corps equipment in

the battalion. Operators are provided for continuous communication service. See FM 17–70 for details.

Section IX. BATTALION MAINTENANCE SECTION

84. Organization

The battalion maintenance section consists of an assistant maintenance officer, a motor maintenance sergeant, a senior equipment mechanic, senior recovery mechanics, senior wheeled vehicle mechanics, an engineer parts specialist, equipment mechanics, an ordnance parts specialist, recovery mechanics, a tracked vehicle mechanic, a turret mechanic, a welder, wheeled vehicle mechanics, an equipment helper, mechanics' helpers, and a sign painter.

85. Duties of Personnel

a. The engineer equipment officer, a member of the battalion staff, exercises immediate supervision over the battalion maintenance section. His duties are to—

(1) Advise the battalion commander, his staff, and subordinate commanders, on technical aspects of automotive and equipment operation and maintenance.

(2) Direct the supply and operations of the maintenance section.

(3) Direct the training of drivers, mechanics, and operators.

(4) Supervise the preparation of reports and records of equipment and supplies.

(5) Coordinate the plan for evacuation of disabled vehicles and maintenance with battalion S4.

b. The assistant engineer equipment officer, under the immediate supervision of the engineer equipment officer, directs the operation of the motor pool shop, and is a source of technical advice and help for personnel working in the company motor pools and in the battalion shop. His duties are to—

(1) Check incoming repair work to determine the amount and nature of repairs needed.
(2) Set up maintenance schedules for vehicles and equipment in accordance with existing directives.
(3) Assign repair and maintenance work.
(4) Inspect shop operations to insure that repair schedules are maintained and that correct methods are being used.
(5) Check completed work to insure that vehicles and equipment are in proper operating condition before being released from the shop.

c. The motor maintenance sergeant, under the supervision of the motor officer and assistant engineer equipment officer, directs the activities of the motor maintenance section. He helps prepare reports, keeps records and files, and trains personnel. He recommends job assignments and priorities and helps the mechanics perform organizational maintenance and repair.

d. The senior engineer equipment mechanic, under the supervision of the engineer equipment

officer and assistant engineer equipment maintenance officer, directs the activities of the engineer mechanics. He assigns and inspects work and gives technical advice and help to the mechanics; prepares necessary reports and keeps records and files of engineer equipment; assists in training equipment operators; and may, under certain circumstances, supervise the use of equipment.

86. Operations

The battalion maintenance section provides organizational maintenance service for headquarters company and all battalion vehicles and other equipment. The battalion maintenance section is supervised by the assistant engineer equipment officer and is under control of the battalion engineer equipment officer. The headquarters company shop is supervised by the motor sergeant. The battalion engineer equipment maintenance subsection issues parts and repair supplies to the other engineer companies.

Section X. FIELD MAINTENANCE SECTION

87. Organization

The field maintenance section consists of an assistant field maintenance warrant officer, a section chief, a machinist, a senior diesel repairman, a senior electric motor and generator repairman, senior equipment repairmen, a senior engineer parts specialist, diesel repairman, electric motor and generator repairman, equipment repairman, engineer parts specialist, intermediate speed radio operator, a special electric device re-

pairman, a welder, a diesel repairman helper, electric motor and generator repairmen helpers, and equipment repairmen helpers.

88. Duties of Personnel

a. The division field maintenance officer is a staff officer and exercises control of third echelon engineer maintenance activities in the division. His duties are to—

(1) Advise commanders and their staffs on technical aspects of engineer equipment operation and maintenance.
(2) Direct the supply and operations of the engineer field maintenance section.
(3) Advise commanders and staff concerning training of engineer maintenance personnel and equipment operators.
(4) Supervise the preparation of reports and records of engineer equipment and supplies.
(5) Coordinate the plan for engineer field maintenance within the division.

b. The engineer maintenance warrant officer, under the immediate supervision of the maintenance officer, directs the operation of the field maintenance shop activities, and is a source of technical advice and help for personnel working in the company motor pools, and in the field maintenance section. His duties are to—

(1) Check incoming repair work to determine the amount and nature of repairs needed and advise as to the proper method of disposition to higher echelon shops.

(2) Set up field maintenance schedules for vehicles and equipment in accordance with existing directives.
(3) Assign repair and maintenance work within capabilities of the field maintenance section.
(4) Inspect operations to insure that repair schedules are maintained and that correct methods are being used.
(5) Check completed work to insure that vehicles and equipment are in proper operating condition before being released.

c. The section chief, under the supervision of the engineer field maintenance officer and the engineer maintenance warrant officer, directs the activities of the field maintenance section. He helps prepare reports, keeps records and files, and trains personnel. He assigns and inspects work and gives technical advice and help. He supervises repairmen, performs functions of equipment repair inspector and such associated activities as supply control.

89. Operations

The field maintenance section inspects and effects third echelon repair of engineer equipment in the division at work sites, whenever feasible. Major items which are determined to be beyond the capabilities of contact repair will be evacuated by the using organization to the supporting engineer field maintenance company. Minor items, such as sniperscopes, small generators, and compressors may, at the discretion of the engineer

inspector, be evacuated to the field maintenance section for repair and return. However, the requirement for maintaining mobility and the lack of evacuation equipment make it mandatory that the field maintenance section does not build up backlogs of items for repair beyond that which can be moved by means of its organic equipment. The engineer field maintenance section is dependent upon the supporting engineer field maintenance company for repair parts.

Section XI. MEDICAL SECTION

90. Organization

The medical section consists of a medical assistant, a section sergeant, company aidmen, a senior medical aidman, ambulance drivers, a clerk-typist, medical aidmen, aid station attendants, and ambulance orderlies. No formal organization exists for company aid teams. Aid men are attached to the companies of the battalions according to the anticipated need for their services.

91. Duties of Key Personnel

a. The medical officer is a staff officer and also commands the battalion medical section, and supervises the medical service of the battalion. He serves as advisor to the battalion commander and staff on matters affecting the health of the command and coordinates the medical plan with the battalion S4. In general, the medical officer—

(1) Instructs battalion personnel in personal hygiene, military sanitation, and first aid.

(2) Makes medical and sanitary inspections and keeps the battalion commander informed of the medical situation in the battalion.
(3) Establishes and operates the battalion aid station and dispensary.
(4) Requisitions medical supplies and equipment required by the medical section.
(5) Prepares the medical plan, including recommendations for location of the battalion aid station.
(6) Verifies the status of medical supplies in all elements of the battalion and takes steps to insure timely replenishment.
(7) Supervises collection and evacuation of wounded.
(8) Supervises preparation of casualty lists, the monthly sanitary report, and other required medical records.

b. The medical assistant, who is a medical service corps officer, helps the medical officer in his administrative duties. The assistant to the medical officer may be directed—

(1) To help the medical officer in providing preventive and first aid services, inspections, and lectures.
(2) To conduct reconnaissance for locating and establishing the medical aid station.
(3) To supervise section personnel activities.
(4) To verify immunization records.
(5) To conduct classes in selected subjects to train the medical section and other battalion personnel.

(6) To perform medical supply, transportation, and administrative functions.

c. The section sergeant, supervised by the medical officer, directs the activities of the section, helps the medical officer provide preventive and first aid services, inspections, and lectures, and assigns tasks to section personnel.

92. Operations

The medical officer, in coordination with S3, supervises medical training and sanitation in the battalion. The medical section provides company aidmen and operates the battalion aid station. Evacuation of casualties from the battalion aid station to the division clearing station is the responsibility of the division medical battalion. Dental care is provided by the medical battalion at the division clearing station.

CHAPTER 6
BATTALION OPERATIONS

Section I. GENERAL

93. Employment

a. The armored division engineer battalion is a self-contained unit designed to provide an optimum combination of equipment and individual skills for forward area engineer tasks which assist armor units. These are: road construction and maintenance, construction and maintenance of fords and bridges, construction and removal of obstacles, preparation and execution of demolitions, and provision of engineer supply services, including water and map supply. These services are available to all units of the armored division. Some of these tasks are performed by the armored division engineer battalion operating as a unit; most of them are done by the subordinate elements of the battalion (companies and platoons) which support the combat commands and battalion task forces. When required, the armored division engineer battalion can be committed as infantry, but this should be done only after careful consideration of the effects of the resulting loss of engineer support.

b. The following are fundamentals of the employment of the engineers:

(1) In a slow moving or static situation, the location of the engineers is dictated by the site of their work missions.

(2) In a fast moving offensive, exploitation, or pursuit, engineers in support of the leading battalion task force must be well forward in the column to assist the task force in the passage of obstacles. The engineer platoon normally marches just behind the leading company team. A bridge platoon or section accompany the platoon as required.

(3) In retrograde movements, the most important engineer mission is to impede the advance of the enemy. The bulk of the engineers are located close to the tail of the withdrawing column.

(4) The engineer platoon supporting a leading battalion task force accomplishes only work necessary for the passage of that battalion.

c. Within each combat command the task force concept is employed by the formation of battalion task forces through crossattachment of tank and armored infantry companies between attached battalions. Other combat, combat support, or service support elements attached to or in support of the combat command may be further attached to or in support of battalion task forces if such is required for a specific mission.

d. The engineer elements which normally provide support for a combat command consist of an armored division engineer company, a bridge platoon from the bridge company, and a water supply team from headquarters company. From these units come the engineers which support the leading battalion task force(s). The engineer

units normally placed with the leading battalion task force(s) are an armored division engineer platoon and a bridge section. Direct support is the normal method of employing engineer troops as long as centralized control, reinforcement, and logistical support from the parent unit are practicable. Active atomic warfare may cause combat commands to disperse so that centralized control is impractical. In such instances, Engineer companies will *normally* be attached to combat commands.

e. The platoon leader of the armored division engineer platoon supporting the battalion task force is the engineer staff officer for the task force. He acts as an advisor to the task force commander on the most efficient and effective employment of the supporting engineers.

94. Standing Operating Procedure

A battalion standing operating procedure (SOP) helps greatly to initiate smooth functioning throughout a newly formed battalion, and to orient incoming personnel. It saves time and effort, increases efficiency, and helps to standardize procedures. A bulky standard operating procedure defeats its own purpose. To be effective, it should be concise, yet informative, understandable, and complete. Appendix II shows a recommended outline for an SOP.

95. Attachment to Combat Commands

a. The Armored Division may be employed in most types of ground combat in either active or nonactive atomic warfare, because of its inherent

adaptability to either type. The use of atomic weapons may make necessary the assignment of much more engineer support than would be required in nonatomic warfare due to the extensive obstacles created.

b. The three combat command headquarters are the nuclei around which the major task forces are organized for the accomplishment of the division's missions. Each combat command is formed on a task force basis for a particular mission by the attachment of tanks and armored infantry and the provision of engineer, artillery, and service support as required by the division mission and the division commander's estimate of the situation.

96. Engineers With a Combat Command

Normally when a combat command is advancing independently, one engineer company and a bridge platoon are attached. When a combat command is in column of battalion task forces, one platoon of the engineer company, with a bridge section, joins and supports the leading battalion task force. When a combat command is moving in more than one column, the leading elements of each column will have supporting engineers and bridging equipment. The amount of engineer support is based on the anticipated engineer work load during the tactical movement. The rest of the armored division engineer company marches in that portion of the column which includes combat command headquarters.

Section II. ADMINISTRATIVE MOVEMENTS

97. Engineer Assistance to Other Arms

a. General. The armored division usually requires engineer help for administrative movements. This work generally consists of—

(1) Providing facilities and assistance during loading and unloading at entraining, embarkation, detraining, and debarkation points.

(2) Maintaining roads and accomplishing any rebuild made necessary after they have been used by track-laying vehicles.

(3) Preparing the new area to receive the unit. This involves providing and improving facilities.

b. Employment. An administrative movement requires that engineers remain at the starting point until the bulk of the division has left. An engineer advance party is provided to prepare the new area before the bulk of the division arrives, and some engineers are sent with each major echelon that moves independently. In general, engineer assistance is limited to work that benefits the division as a whole, or for which engineers are better trained and equipped than other troops. Other units provide their own facilities and labor so far as practicable.

98. Engineer Work at Entraining Points

a. Types of Work. Engineers at entraining points may—

(1) Construct or strengthen ramps and loading platforms.

(2) Construct or improve routes of approach.
(3) Construct or improve railway spurs and sidings.
(4) Assist troops of other arms in loading and lashing equipment.

b. Loading Facilities. Every effort is made to choose entraining points that require a minimum of new construction or improvement. However, loading ramps and platforms often have to be built. Loading facilities are of two general types: side platform, and end-loading (FM 5–10 and TM 5–280). The truck-mounted cranes of the armored division engineer battalion may also be used to assist in loading.

99. Engineer Work on Roads

a. Engineer Reconnaissance. Engineers make a detailed route reconnaissance before a motor march. It is particularly important to determine the load capacities of bridges and roads, and to estimate the density and speed of traffic that the roads can carry without undue wear and tear. Basing his decisions on this information, the division engineer recommends routes to be followed and maximum speeds for both tracked and wheeled vehicles.

b. Engineer Work. Engineer road work for a troop movement usually is completed before the move starts. Such work consists of strengthening existing bridges and making minor repairs to road surfaces. Roads which do not need construction work or extensive repairs should be chosen if possible.

c. Engineers With Advance Elements. Engineer troops accompany advance elements of the force to do whatever work is necessary to meet contingencies on the march. Engineer troops are also located in the march column or columns, to be readily available for work beyond the capacity of the engineers with the advance elements, and to do any maintenance work which becomes necessary as the force advances.

100. Engineer Work at Destination

Troops moving on foot, by truck, or by tanks should be able to move their organic and attached transportation off the road and into their bivouac areas without halting. To make this possible, engineers may construct temporary crossings over roadside ditches and gullies, improve secondary roads and trails, and clear new trails. Engineer work at detraining points is similar to that at entraining points.

101. Movement by Combat Commands

An armored division engineer company normally is adequate to support the movement of a combat command. Platoons, and infrequently squads, or an engineer company may be further placed in support of the leading elements of a combat command, in accordance with the plans of the combat command commander.

102. Traffic Circulation

Engineers assist the military police in traffic circulation by road and bridge reconnaissance,

and by supplying road maps, overlays, signs, and markers.

a. Road and bridge reconnaissance is conducted in accord with the principles discussed in FM 5–36. Since the time available for reconnaissance usually is limited, priority is given to the collection of the most essential information. This information must be accurate and up to date, and should include such data as—

(1) Map or sketch of road net, including detours and alternate routes.
(2) Physical characteristics of roads, including the type of surface, road width, and number of lanes.
(3) Location, type, and characteristics of limited roadway surfaces, such as bridges, underpasses, steep grades, and one way defiles. Information on such features should include load-carrying capacity, width, conditions of approach, vertical clearance, and limitations on speed and distance between vehicles.
(4) Mileage between important road intersections.
(5) Location and characteristics of facilities for turning, parking, and halting.
(6) Sections of important roads where engineer assistance is required or may be required because of difficult operating conditions.

b. Engineer Recommendations. Road and bridge data obtained from engineer reconnaissance are applied, by the use of symbols, to a large-scale map or overlay of the area concerned,

and submitted to G4 with the engineer reconnaissance report. Included in the report are recommendations for protecting the road net from such abuses as excessive speeds, overloading of roads and bridges, heavy and continuous traffic on roads with poor surface or subgrade, and use of roads in need of repair. The division engineer makes recommendations concerning traffic-circulation plans consistent with the engineer limitations of the road net and the availability of engineer troops.

c. Supply of maps and overlays is an engineer function. Allotments to units, individuals, and vehicles are established by the engineers as requested by G4.

d. Supply of road signs and route markers in traffic operations is an engineer responsibility. Determining the need for such signs and markers is a responsibility of G4, who coordinates with the division engineer and the provost marshal. Signs are supplied to identify places, mark routes, give traffic regulations, and warn of special road conditions. See FM 5–10 for proper sizes and locations for traffic signs.

103. Battalion Movement

a. General. In administrative movements the armored division engineer battalion usually moves as a unit forming an integral part of the division, except for required detachments (par. 93). A move may be by motor, rail, water, or air. For long moves, the battalion prepares its own equipment for shipment in accordance with current

directives. For motor and rail movement it also loads its own equipment.

b. Motor March. The battalion is completely mobile in its organic transportation. Routine motor marches will normally be covered by a battalion standing operating procedure, with such items as routes, destinations, initial points, orders of march, and speed, specified separately for each move (see FM 17–1).

c. Rail Movement. In training and preparation for movement by rail the engineer battalion must become familiar with packing, boxing, and crating organic equipment, and loading equipment and personnel on railway cars. A battalion rail-movement table and rail-movement annex to the SOP are prepared and kept up to date. Detailed information on rail movements, types, characteristics, and capacities of railway cars, loading plans, and loading scales and tables is found in FM's 5–35, 100–5, 100–10, and 101–10 and AR 55–21.

d. Air Movement. The prime consideration in loading the battalion for air movement is the anticipated employment in the airhead or at the destination. Troops can best be controlled during the operation and after arrival at the landing area if unit integrity is maintained. Key personnel and equipment should be distributed throughout the airlift to minimize the effect of losses. Equipment too heavy or too bulky to be transported by air must be either disassembled for movement and then accompany the followup echelon to the destination, or turned in to the appropriate depot. Before emplaning, troops are instructed in the loading and lashing of equip-

ment, in safety regulations on airstrip and in flight, and in the plan of assembly after landing. The battalion rail movement table, with a few modifications, may be used in compiling an air movement table. For further details of movement by air see FM's 57–30, 100–5, 100–10, 101–10, and TM 57–210.

e. Water Movement. Water movement requires special packing, crating, and marking of equipment, and additional training of personnel. Destination, mission, type of operation, anticipated employment on disembarking, available shipping space, and type of vessel are factors which determine whether the unit will be combat loaded or convoy loaded. The same data contained in the battalion rail movement table, but in slightly different form, can be used for the unit personnel and tonnage table in preparation for movement by water. For additional information on water movements see FM's 31–5, 100–5, 100–10, 101–10, and SR 55–720–1.

Section III. TACTICAL MOVEMENTS

104. General

A march in a combat zone is a tactical march when a column will be employed against the enemy upon making contact, or when interference from the enemy is a possibility. The mission of the column, proximity of hostile ground forces, terrain over which the column will travel, type of enemy resistance expected, and activity of hostile air forces are all factors which will determine the organization and composition of the

column. Division tactical march orders are prepared by G3 in coordination with other staff officers, particularly G4 and the division engineer, for the selection of routes and required additional transportation. Basic road spaces for motor elements, as shown in FM 101–10, should be maintained for all divisional elements.

105. Battalion Participation

The armored division engineer battalion, in a tactical march, may have two companies and up to two bridge platoons supporting other march serials of the division. The remainder of the battalion usually marches with the division troops serial.

106. Battalion March Unit

When the armored division engineer battalion marches as a separate unit, the following conditions apply:

a. Formation for the March. The march formation is governed primarily by the tactical situation. Each company normally forms a march unit. However, when the battalion moves as a unit the companies, less heavy equipment, comprise a serial. Heavy equipment, such as crane shovels and 5-ton trucks with semitrailers, are grouped to form a separate serial. Maintenance personnel ordinarily march at the end of each serial.

b. Communication. When signal security permits, radio is the principal method of communication while the battalion is on the march. However, visual signals, particularly arm-and-hand and flag

signals, are used extensively for column and vehicle control. Messengers are employed occasionally, but only for such purposes as carrying maps and overlays.

c. Road Markers and Guides. Whenever possible, road markers should be used at all points where there may be a question as to the correct route to be taken by a column. Arrangements must be made for personnel serving as markers to be picked up by the last vehicles of the column. The situation may sometimes even require the use of road guides.

d. Halts. Unit SOP's should prescribe a scheduled halt of 15 minutes at the end of the first hour and thereafter scheduled 15-minute halts every 2 hours on the hour. Halt times will be based on the IP crossing time of the leading elements of the column. March units halt during this period and make no attempt to close up gaps in the column. All drivers and vehicle crews perform their scheduled "at halt" maintenance operations. Since halts for refueling are scheduled in advance, commanders must know the rate of fuel consumption of their units. The distance traveled by the armored division engineer battalion before refueling should not exceed 75 miles, or a distance in which more than three-quarters of the capacity of vehicle fuel tanks is expended.

e. Control and Supervision.

(1) Control of the battalion on the march can only be attained by a high degree of training and discipline. Detailed supervision by the battalion staff is necessary to insure that the column is formed ac-

cording to plan. A staff officer is designated to check the column at the initial point, the arrival of subordinate units, and the order of march. A control vehicle is selected for each march unit of the battalion. A well-marked route, road markers, and road guides, also assist in control of the column and assure smooth movement. Radio is the primary means of control on the march. Factors affecting the use of radio are security, capabilities and limitations of equipment, tactical requirements, terrain, and weather. Other means of control are hand signals, flags, phase lines, and control points.

(2) Supervision of the march column is the responsibility of all battalion officers and noncommissioned officers. Items to check include: condition of vehicles, distances between march units, speed, and general conduct of march units on the move. Necessary corrections are made at once.

f. Security. All movement in the combat zone is governed by strict security regulations, with special attention to the possibility of air attack. Distance between vehicles is greater than in rear areas. Panel sets are kept in readiness for instant used to avoid attack by friendly aircraft. The battalion must be well trained in passive defense against air attack. When there is a possibility of ground attack, as in a fluid situation or when guerillas are operating in the region, tactical

plans are made by the battalion commander and subordinate commanders to meet the attack. A system of observers and signals is established. Individual weapons and ammunition are kept in the hands of the troops. Machine guns are manned and rocket launchers are dispersed throughout the column. Tactical considerations, rather than administrative considerations, govern the conduct of march.

g. Night Marches. The battalion must be able to conduct night marches under all conditions. Constant practice offers the most valuable training, and this practice is conducted on unfamiliar roads of all types. Special attention is given to the planning and execution of night marches. The importance of route reconnaissance and the proper use of road guides and markers increases. Control of a night march is facilitated by decreased speed, decreased distance, and increased reconnaissance and security.

Section IV. SIGNAL COMMUNICATIONS

107. Battalion Communications

a. The armored division engineer battalion provides radio equipment operators, and transportation for stations to operate in the division command net, the division intelligence radio teletype net, and the armored division engineer battalion net.

b. First and second echelon maintenance of communication equipment is performed by the units to which the equipment is organic. Third

echelon maintenance is performed by the division signal battalion.

108. Means and Employment of Signal Communications

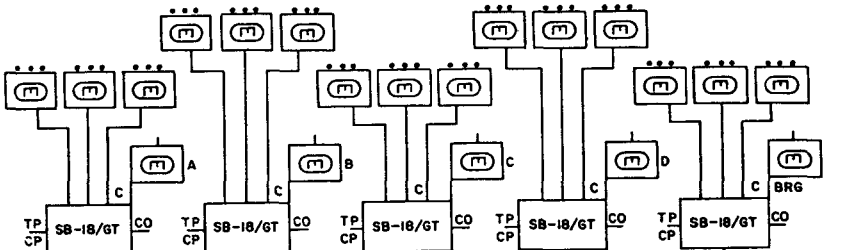
Signal communications normally employed in the Armored Division Engineer Battalion are radio (voice, teletype, and CW), wire, messenger, visual, and sound. Although radio is the primary means, complete dependence cannot be placed upon it alone. The various means are so employed that each complements the capabilities and limitations of the others so as to provide an integrated area (grid) system obtaining maximum speed, flexibility, security, and reliability. This system is also capable of integration on an area basis with the system of the next higher command, and with adjacent or supporting headquarters when necessary. Within available means, alternate signal communication systems are planned for and established as required. All radios of the armored division are installed and operated from vehicles, aircraft, or both, with the exception of those used in dismounted operations. For detailed information on signal communications within the armored division, see FM 17–70 and FM 11–11.

109. Signal Diagrams

a. See figure 11 for the wire diagram of the Armored Division Engineer Battalion.

b. See figure 12 for the radio diagram of the Armored Division Engineer Battalion.

c. See figure 13 for the radio diagram of the Armored Division Engineer Company.



WIRE EQUIP	HQ CO	LINE CO	BRG CO
SWBD SB-22/PT	1		
EMERG SWBD SB-18/GT	1	1	2
TELEPHONE TA-1/TT	9		4
TELEPHONE TA-312/PT	6	7	6

NOTE: EQUIPMENT LISTED BUT NOT SHOWN ON DIAGRAM IS USED DURING DISPLACEMENT AND AS OTHERWISE REQUIRED

Figure 11. Wire diagram of the Armored Division Engineer Battalion.

d. See figure 14 for the radio communications diagram of the Bridge Company, Armored Division Engineer Battalion.

e. See figure 15 for a type radio net diagram of the Armored Division Engineer Battalion.

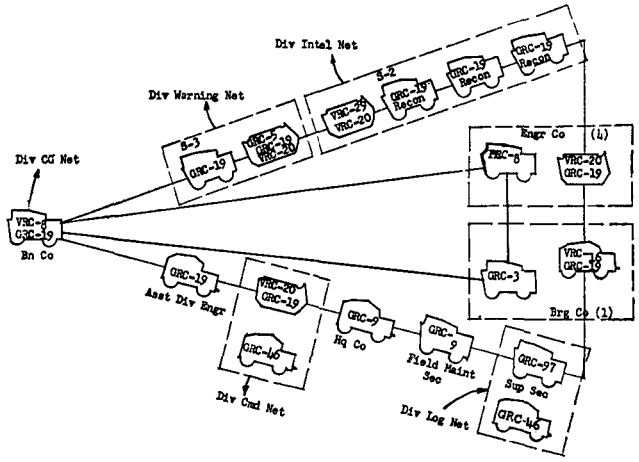


Figure 12. Radio diagram of the Armored Division Engineer Company.

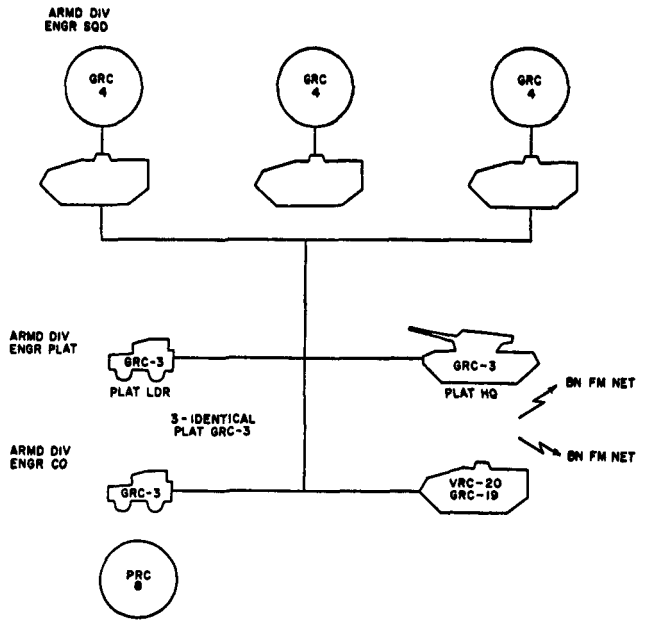


Figure 13. Radio diagram of the Armored Division Engineer Battalion.

Radio Communications Diagram

TOE 5-218T ROCAD

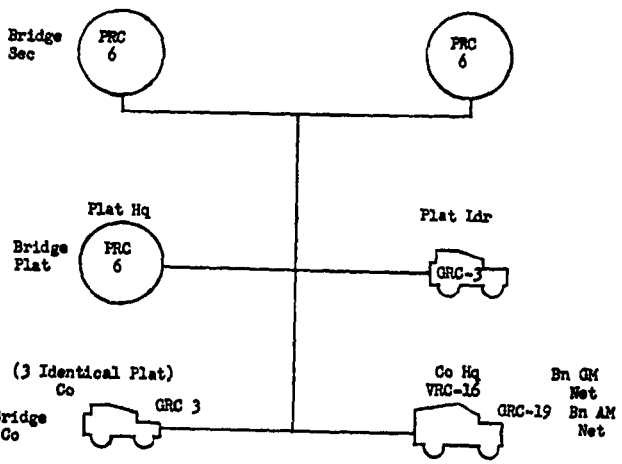


Figure 14. Radio communications diagram of the Bridge Company, Armored Division Engineer Battalion.

Section V. OFFENSIVE ACTION

110. General Engineer Duties

a. In general, the initial mission of the armored division engineer battalion includes reconnaissance and preparation of the axial routes of advance. Plans for traffic circulation are formulated, if such control is necessary. The preparation of axial routes may require the rehabilitation of existing roads or trails, or the construction of new roads and trails, always considering the wheeled and tracklaying vehicles and the armored division loads. Consequently, the magnitude of the engineer effort may vary considerably.

b. Specifically, engineer duties in the offense include—

(1) Conducting engineer reconnaissance and supplying up-to-date maps.
(2) Opening and improving roads and bridges for troop movement, supply, and evacuation.
(3) Assisting in preparation of traffic circulation plans.
(4) Assisting forward movement of tanks, armored infantry, and supporting arms by repairing roads and opening trails, constructing bridges, and removing obstacles (fig. 16).
(5) Locating, marking, and destroying mines (fig. 17).
(6) Assisting in flank security through use of demolitions, minefields, and obstacles.
(7) Constructing advanced air landing strips for army aircraft.

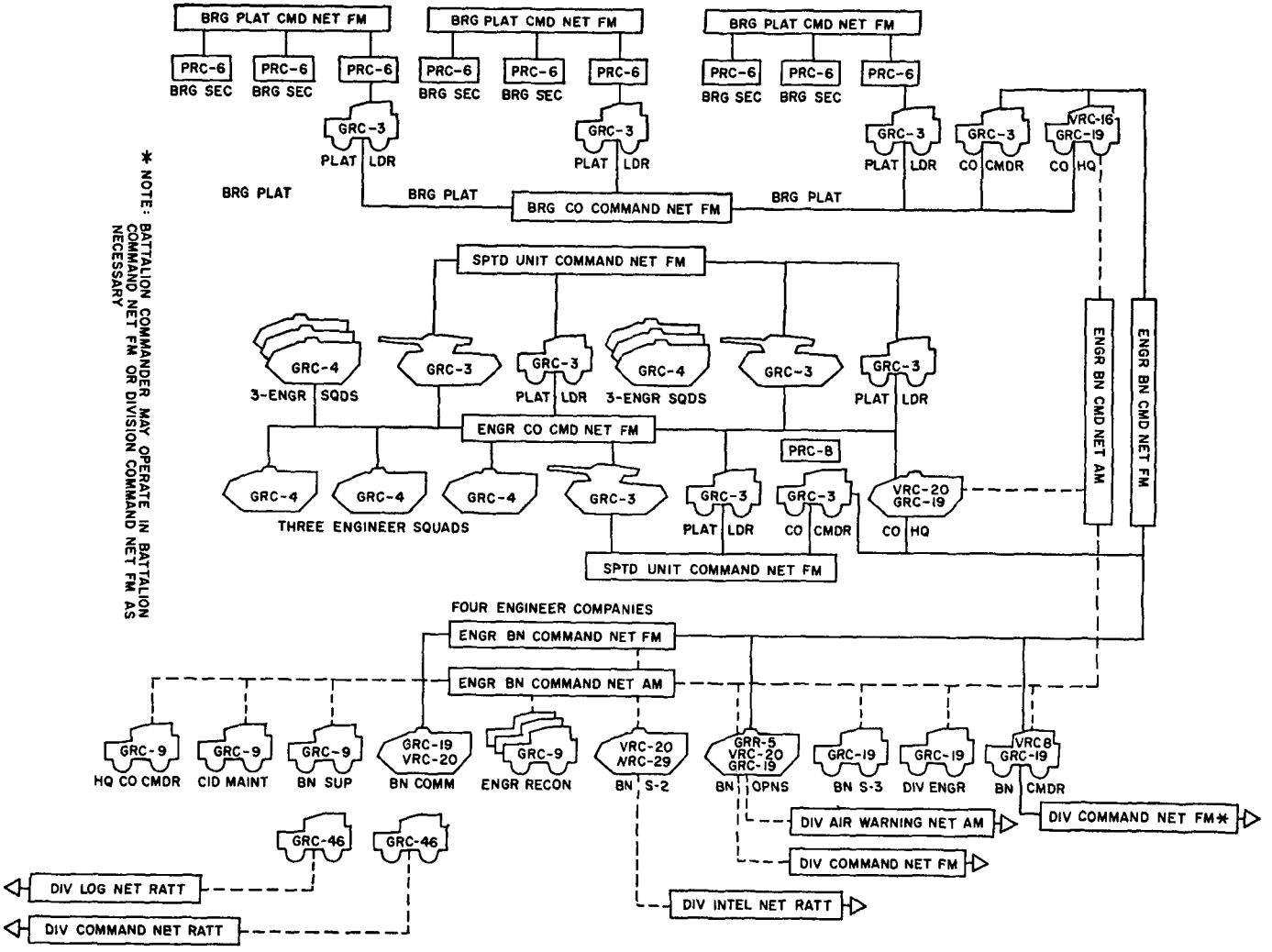


Figure 15. Type radio net diagrams of the Armored Division Engineer Battalion.

(8) Locating, marking, and improving sources of potable water supply and access roads thereto.

Figure 16. Armored Division Engineers removing obstacles.

Figure 17. Armored Division Engineers assisting passage of armor through minefield.

(9) Advising the supported unit commander on engineer matters.
(10) Collecting engineer intelligence, information, and producing and disseminating engineer intelligence.

111. Control of Engineer Effort

The division engineer recommends the disposition of engineer troops for each division operation (fig. 18) and exercises overall supervision of engineer effort. Engineers may be attached to, or placed in support of other elements.

112. Types of Offensive Operations

There are four general types of offensive action, envelopment, penetration, turning movement, and frontal attack. The type initially employed by a commander is based upon his estimate of the situation, and the types subsequently employed are based on his continuing estimate. Small armored units normally will not conduct offensive actions alone, but will participate as part of a larger force. In participating in the four general types of offensive actions, small armored units will be required to conduct an attack or an advance to contact. Exploitation and pursuit are phases of offensive operations which may be continuations of either of these forms. For a detailed discussion of offensive operations see FM 17–1.

113. Engineers in the Penetration

Armored division engineers normally are attached to each assaulting combat command. The

TYPE UNIT	ORGANIC TO DIV	ATTACHED TO DIV	CCA	CCB	CCC	DIV TRP	DIV TN
Armor Bn 90-mm (4 Co)	1/11 Armor 1/12 Armor 1/13 Armor 1/14 Armor		1/11 Armor 1/14 Armor	1/12 Armor	1/13 Armor		
Armd Inf Bn (4 Co)	1/91 Inf 1/92 Inf 1/93 Inf 1/94 Inf		1/91 Inf	1/92 Inf 1/93 Inc	1/94 Inf		
FA HOW Bn 100-mm SP (3 btry)	1/50 Arty 1/51 Arty 1/52 Arty		1/50 Arty (DS)	1/51 Arty (DS)		1/52 Arty	
FA Comp Bn	1/53 Arty					1/53 Arty	
AW Bn (SP) (4 Btry)		2d AW Bn (SP) 626th AAA	Btry A 2/626th AAA	Btry B 2/626th AAA		2d AW Bn (SP) 626th AAA (-)	Btry D 2/626th AAA
Engr Bn (4 Co)	23d Engr		Co A	Co B	Co C	23d Engr (-)	
Brg Co (3 Plat)	Co E, 23d Engr Bn		1st Plat	2d Plat		Brg Co. 23d (-)	
Cav Sq (4 Trp)	1/22 Cav					1/22 Cav	
Med Bn	23d Med		1st Plat, Amb Co (Spt) 1st Plat, Clr Co (Spt)	2d Plat, Amb Co (Spt) 2d Plat, Clr Co (Spt)	3d Plat, Amb Co (Spt) 3d Plat, Clr Co (Spt)		23d Med
Ord Bn	23d Ord		Co A (Spt)	Co B (Spt)	Co C (Spt)		23d Ord
QM Bn	23d QM						23d QM
Sig Bn	23d Sig		1st Plat, Fwd Comm Co (Spt)	2d Plat, Fwd Comm Co (Spt)	3d Plat, Fwd Comm Co (Spt)	23d Sig	Tn Area Op Plat (Spt)
MP Co	23d MP					23d MP	
Avn Co	23d Avn		A Flight (Spt)	B Flight (Spt)	C Flight (Spt)	23d Avn (-)	
Admin Co	23d Admin						23d Admin

Figure 18. Worksheet. Example of Organization for Combat, Armored Division.

size of the engineer elements attached is governed by the anticipated strength necessary to reduce obstacles and to support the advance of the assaulting forces. Bridging must be so positioned that it is available when needed (fig. 19). When the situation warrants, armored division engineer detachments can be attached to or placed in support of each leading reinforced battalion. Engineers held under division control have the mission of assisting in the movement of the remainder of the division.

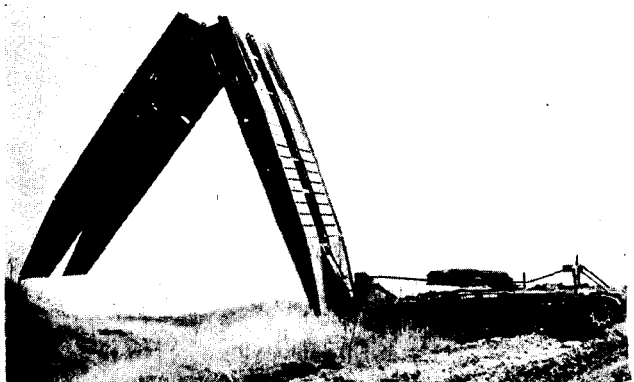


Figure 19. Armored Vehicle Launched Bridge (AVLB).

114. Engineers in the Envelopment

In the envelopment armored division engineers must be well forward in the column in order to facilitate the advance of the division. As in the penetration, a company of engineers and as much as a bridge platoon are normally attached to or in support of each of the major tactical commands to be used in the attack, with the battalion (less detached elements) under division control.

115. Engineers in the Exploitation or Pursuit

a. Division in Column. When the combat commands of the division are in column, a lettered engineer company, with a bridge platoon attached, may be attached or in support of the leading combat command; the battalion (less detached elements) usually is kept under division control. If additional bridging is attached to the division by corps, it may be kept under division control until it is needed by the leading combat command, or until a following major command is committed to action or placed on another axis of advance.

b. Division in Line. When two or three combat commands are following independent axes, each is given sufficient engineers and bridging equipment to facilitate movement over its assigned axis (fig. 20).

116. Engineers in Covering Force Action

A battalion sized armor unit or armored cavalry squadron employed as an advance covering force will normally have the same engineer support afforded a battalion task force in offensive operations. However, due to distances involved in a covering force action, the armored engineer platoon and necessary bridging will be attached rather than in support.

117. Employment of Nondivisional Engineers

Bridging equipment and engineer units not organic to the armored division engineer battalion may be attached to, or placed in support of the division to fulfill the requirement of the attack

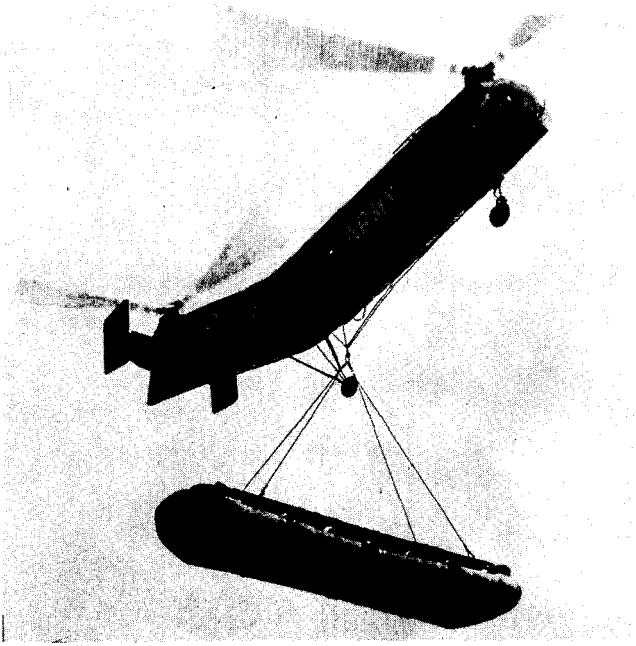


Figure 20. Helicopter placing a bridge component.

plan. The size of the engineer elements attached or supporting, is governed by the anticipated strength necessary to reduce obstacles and to support the advance of the assaulting forces. When necessary, nondivisional engineers may further be attached to combat commands.

118. Engineer Reconnaissance in Offensive Action

a. Engineer reconnaissance in the offense is continuous and as detailed as the speed of advance permits. Routes of advance and alternate routes are thoroughly examined for serviceability, type,

condition, location of critical points, alternate routes, mines, and condition and types of bridges. Reconnaissance teams provide the division engineer with early, reliable engineer information in the area over which the division is to advance. This reconnaissance will enable the division engineer to make an estimate of engineer work to be done and of engineer materials available. The on-the-ground reconnaissance must be supplemented by air reconnaissance, map, and aerial photograph studies, and study of reconnaissance from other elements of command. It is essential that this reconnaissance be made prior to the movement, since the information gained provides a basis for the estimate of engineer troops, supplies, and equipment necessary to support the operation and for the selection of routes and the formation of traffic circulation plans. Terrain characteristics which appear favorable to the advance are closely examined, especially for possible enemy use of mines, obstacles, and defending weapons. Initially engineer reconnaissance during the advance is performed by reconnaissance teams from battalion headquarters.

b. Engineer reconnaissance during the attack is as detailed as time and conditions permit. On the ground, personal reconnaissance is made by commanders and is supplemented by the study of maps, aerial photographs, and air and ground reconnaissance reports. Engineer companies attached to or in support of combat commands make continuous reconnaissance of the routes of advance, particularly the main supply route (MSR) and the bridges, obstacles, mines, and sources of

engineer materials in their assigned areas. Engineer battalion reconnaissance teams continue their general reconnaissance effort, following closely the forward engineer companies and paying careful attention to the routes of advance, the MSR and lateral roads, bridges, obstacles, engineer materials, and sites for new water points. Special reconnaissance missions are assigned by the battalion S2 as required. On the basis of this reconnaissance information, engineer operational plans are made and means are provided to assist in maintaining the momentum of the attack.

Section VI. DEFENSIVE ACTION

119. Defensive Operations

a. The introduction of atomic weapons to the battlefield has changed past concepts, particularly with respect to the position defense. Defensive operations on the atomic battlefields are characterized by flexibility, dispersion, and the necessity for additional defensive localities to be located in greater depth.

b. Defense under atomic conditions is characterized by adequate and highly mobile reserves, increased distances between elements, increased requirement for surveillance between forces, and carefully planned and coordinated fires to cover the areas between forces.

c. An effectively coordinated barrier system is of particular importance when defending on the wide frontages and depths which are normal under conditions of atomic warfare. Careful consideration must be given the necessity for free-

dom of maneuver of the striking force in the mobile defense, and the routes to be used by the reserve in counterattacks in the position defense. Availability of manpower, material, equipment, and time impose a limitation on the extent of barrier construction. Maximum utilization must be made of natural barriers and CBR barriers. Use of prepositioned atomic weapons assists in creating additional obstacles and in denying areas to the enemy. Use of barriers may cause temporary massing of enemy forces creating a suitable target for friendly atomic attack.

120. Doctrine of Defense

Defensive doctrine contemplates the selection and organization of a battle area to repel, contain, or canalize the enemy. Security forces are used to detect the time, direction, and size of the enemy attack and to delay and disorganize the attack, and utilize reserve forces to repulse or destroy the enemy by counteroffensive action. For additional discussion of the armored division in defensive operations, see FM 17–100 and FM 17–1.

121. Types of Defense: Mobile and Position

There are two basic types of defense, the mobile defense and the position defense.

a. The mobile defense employs a combination of offensive, defensive, and delaying actions, with the success of the defense depending upon offensive action. The primary objective of the mobile defense is the destruction of the attacking force.

In the mobile defense, minimum forces detect the enemy and canalize him into killing grounds, where the striking force attacks and destroys him. The mobile defense is primarily oriented toward the enemy, and is designed to cause his destruction in front of or within the defensive area. The holding of the terrain is less critical in the mobile defense than in position defense.

b. In position defense, the efforts of the defending force are directed toward stopping the enemy at a preselected line of defense. The reserve is used to add depth, block, or to restore the position by counterattack. The position defense is oriented toward holding ground, rather than toward the destruction of the enemy.

122. Engineer Missions

Engineer missions in all types of defensive action are relatively the same. In general, the mission is to impede the advance of the enemy by—

a. Assisting the movement of the reserve in the counterattack and attack by preparation of counterattack routes.

b. Increasing the defensive capabilities of combat troops in organizing the ground and preparation of defensive positions.

c. Preparation of routes for resupply and evacuation.

d. Creating obstacles in roads and other avenues of approach from the flanks.

e. Performing general engineer work.

123. Control of Engineer Effort

In the position defense, armored division engineer elements may be attached to the combat commands, or they may be retained under control of the battalion commander and support the action of the combat commands. The criterion for attachment or support is the ability of the engineer battalion to control and direct the action of these subordinate elements. Engineer elements attached to the combat commands are kept under combat command control; rarely are they attached to the battalion task forces.

124. Engineers in the Mobile Defense

a. General. Since attack by a powerful striking force is the key to the success of the mobile defense, most engineer duties are the same as for the offense. Engineers make necessary repairs or improvements to roads and bridges on all routes selected for the movement of the striking force. Engineers with the combat commands in the forward defensive area improve routes to permit the rapid movement of strong points. When authorized, prepositioned atomic demolitions may be used to deny areas to the enemy and strengthen the defensive position. Armored division engineers may be retained under the control of the armored division engineer battalion or attached no lower than to a combat command. The criteria for attachment or support are the tactical situation and the ability of the parent battalion to control and direct the action. See fig. 21 as an example of mobile defense.

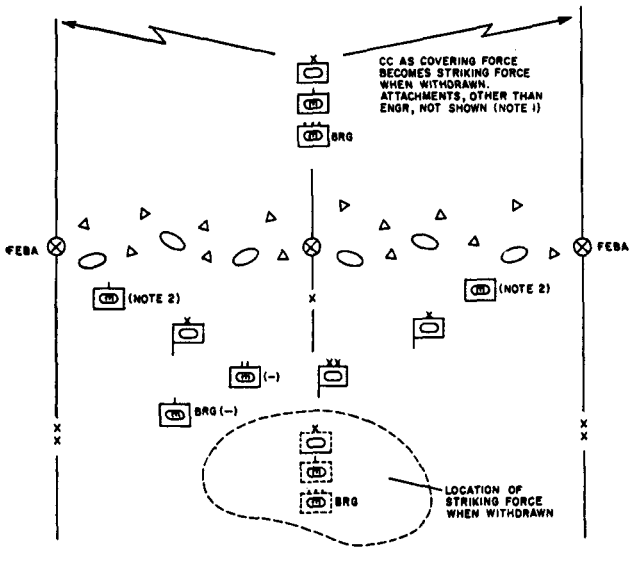


Figure 21. Armored Division Engineer Battalion in an example of mobile defense.

b. Counterattack in Mobile Defense. The counterattack by the striking force is the key to the success of the mobile defense. Time permitting, detailed counterattack plans should be made to meet every contingency. Detailed fire plans are prepared to support each counterattack plan. Atomic fires are planned for each likely area of enemy attack in front of or within the battle area. Such fires are closely coordinated with the plan of maneuver. Counterattack plans must be disseminated to all lower echelons in

sufficient time to permit a thorough study and detailed reconnaissance by subordinate commanders.

125. Engineers in the Position Defense

a. Organization. In the position defense the division commander weighs the factors of mission, terrain, and enemy and own situation, and assigns tank and armored infantry elements to the combat commands in the proportion needed. Generally, the bulk of the armored infantry units occupies the main battle position while the majority of the tanks, less those attached to the combat commands in the battle position, are held in division reserve. The combat commands organize battalion task forces. Combat commands on the main battle position assign each battalion task force a sector to be defended or a reserve mission.

b. General. Armored division engineer elements may be attached to the combat commands, or they may be retained under control of the battalion commander and support the action of the combat commands. The criterion for attachment or support is the ability of the engineer battalion to control and direct the action of these subordinate elements. Engineer elements attached to the combat commands are kept under combat command control. Rarely are they attached to the battalion task forces.

c. Tasks. The division commander specifies the type of defensive position (fig. 22) to be used and the priorities of construction. The division en-

gineer advises the commander on such matters as mine laying, camouflage supervision, supply of class IV camouflage and fortification materials, employment of prepositioned atomic weapons, and the employment of engineer troops. Engineers prepare important demolitions, lay certain minefields, and prepare routes of movement for counterattacks and for supply and evacuation. The division engineer assists in the formulation of the overall barrier plan and its implementation.

126. Engineers for Covering Force Action

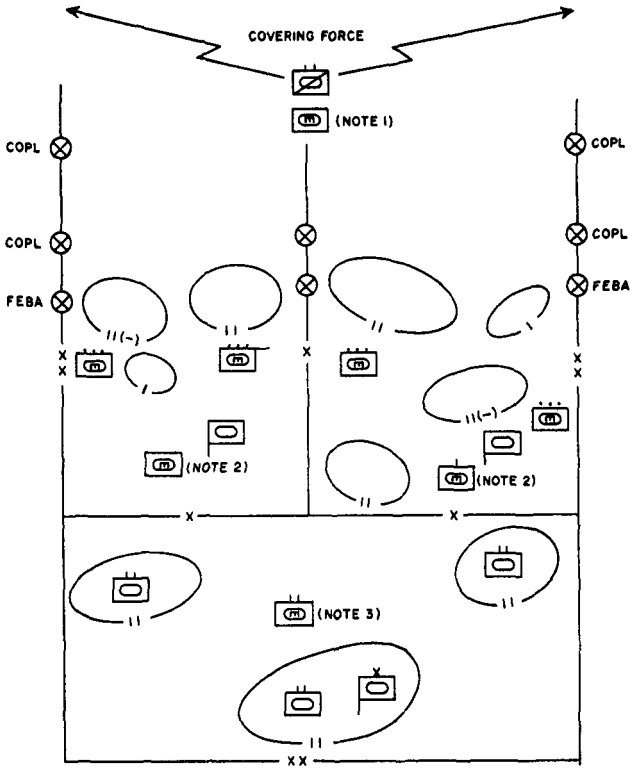
A battalion sized armor unit or armored cavalry squadron acting as a covering force in defensive operations will normally have engineer support. Since all elements of the covering force are placed under one command, the engineers supporting this operation are attached.

127. Obstacles and Barriers

a. Position Defense. In the position defense, obstacles are used extensively. Time permitting, the defensive capabilities of the ground are augmented by artificial obstacles and the improvement of natural obstacles, until a barrier zone has been created, through which the enemy cannot penetrate without a costly expenditure of men and material.

b. Mobile Defense. Obstacles and barriers are used in mobile defense to delay or canalize the enemy, but are positioned so that gaps and lanes in between obstacles and in minefields leave open routes for friendly tanks and amored infantry

to move forward from rear or adjacent areas in the battle position to destroy or repel the enemy.



NOTE 1. ENGR NORMALLY ATTACHED TO COVERING FORCE. SIZE OF UNIT WILL VARY WITH MISSION OF COVERING FORCE AND ENGR TASKS TO BE PERFORMED. ENGR NORMALLY REVERT TO BN CONTROL WHEN COVERING FORCE WITHDRAWS

NOTE 2. MAY BE ATTACHED TO, OR IN SUPPORT OF, CC. ENGR PLATOONS REMAIN UNDER COMPANY CONTROL

NOTE 3. PROVIDES ENGR SUPPORT FOR DIVISION AS A WHOLE. PREPARED TO PROVIDE ENGR COMPANY TO DIVISION RESERVE WHEN COMMITTED

Figure 22. Disposition of forces, position defense.

128. Engineer Reconnaissance in Defensive Action

Engineer reconnaissance in the defense and in the offense is continuous and detailed. Emphasis is placed on route reconnaissance for counterattack forces, and on engineer reconnaissance throughout the defensive area. When the armored division is assigned a sector for position defense, the engineer battalion reconnaissance teams search the area in detail and report all items of engineer interest. This information then becomes the basis for planning obstacles in the division barrier zone; routes of supply, evacuation, and withdrawal, or possible denial operations. In the mobile defense, engineer reconnaissance is accomplished primarily in conjunction with attack plans and is carried out under the direction of the unit engineer, with or without personnel from the engineer battalion reconnaissance section.

129. Employment of Engineers on Flank Security

a. Flank security depends on such factors as—

(1) Terrain.
(2) Road net.
(3) Enemy strength, disposition, morale, and mobility.
(4) Availability of friendly reinforcing or reserve units.
(5) Adequacy of communications.

b. Interior units are secured by coordination with adjacent units. Liaison is maintained with neighboring units so that the defense commander will be kept fully informed of developments in adjacent areas. Maximum use should be made of

army aircraft. If the defending unit has an exposed flank or flanks, reconnaissance troops are used to patrol critical areas and act as contact parties. They may establish observation and listening posts. In the event of a successful enemy attack on the flank, units of the mobile reserve launch an attack. Engineers have the same duties in flank security as in the defense, including the construction of obstacles, the preparation of demolitions, and the laying of minefields. Engineers with the mobile reserve units do essentially the same work as in the offense.

Section VII. DEFENSE AGAINST ATOMIC WEAPONS

130. General

a. Injuries to persons from an atomic attack can be divided into four general categories—those caused directly by blast pressure wave; those caused when buildings are wrecked; those caused by burns, either in the wreckage or from radiant heat; and those caused by nuclear radiation, either directly or through residual contamination.

b. Radiological defense is defined as the protective measures taken to minimize damage to persons and materials from an atomic burst. It includes such measures as—

(1) Training, organization, and distribution of personnel.

(2) Preparation and maintenance of fixed and portable structures and equipment.

(3) Teaching of techniques and procedures, including use of detecting equipment,

protection or removal of exposed personnel, and decontamination of personnel, equipment, structures, or terrain.

131. Command Responsibilities

Commanders at all echelons are responsible for training radiological survey personnel, preparing radiological survey plans, initiating radiological surveys and resurveys when necessary, evaluating data accumulated from surveys, and disseminating radiological survey information for protection against radiological hazards.

132. Organization and Functions

a. All echelons can perform radiological surveys within their responsibilities with regularly assigned personnel and equipment. Some temporary changes in duty assignments of unit personnel will be required when radiological surveys are conducted, but such changes should not be allowed to interfere with the primary mission of the unit.

b. A radiological survey team consists of a control party and two or more survey parties as required. A control party consists of a variable number of individuals depending upon the situation. Ground radiological survey parties consist of two individuals, a monitor and an assistant. The monitor takes instrument readings using the dosimeter; records dose rates, time taken, and location of each reading; and transmits readings as directed. The assistant may be adviser and/or a radio-telephone operator as the situation dictates. The company is the basic unit for conducting radiological surveys.

c. At battalion headquarters one control party and two survey parties are trained. Each company trains and organizes a minimum of two ground radiological survey parties. Only one party at a time performs survey operations while the other party is prepared to act as a replacement. The company party is capable of surveying the area normally occupied by the company in approximately ½ to 1 hour. Company units will report through channels by the fastest means available the first indication of fallout in their areas.

d. Normal staff procedures and functions apply in actions involving radiological fallout. The battalion S2 performs the following functions:

(1) Coordinates radiological survey operations.

(2) Maintains the radiological fallout situation map.

(3) Interprets radiological survey data and provides fallout information to the commander and staff.

(4) Disseminates radiological fallout information according to regularly established procedures for handling all intelligence. Division G2 exercises general staff supervision over all radiological survey operations in the Armored Division coordinating with the division and corps chemical officer.

133. Before Burst Operations

a. The division engineer is responsible for

furnishing technical advice and assistance in the construction of protective works required for radiological defense in the division. He may provide troop units to construct certain key installations if so directed.

b. The principal effect of atomic warfare on engineer operations is to increase the amount of engineer work to be accomplished. Technical procedures are generally unchanged. Camouflage assumes added importance, and more camouflage materials are required. Units do their own camouflage work, under the technical supervision of the engineer unit commander. Alternate sources of water supply are located and developed in advance, to reduce to a minimum the necessity for processing contaminated water.

c. When the enemy is capable of employing atomic weapons, the defense is dispersed in relatively great depth. This increases the requirements for defensive minefields and tactical barrier minefields. Engineers supervise and coordinate the installation of these minefields. Fortifications which are particularly complex, or which require extensive engineer work beyond the capacity of the using unit, are constructed by the engineers. Fortifications are designed to protect troops against most air bursts. Slot dozed trenches may be provided to protect armored and wheeled vehicles from the drag effect of an atomic explosion. Additional engineer unit before burst tasks include—

(1) Surveying area for suitable shelters and sheltered areas.

(2) Dispersing unit personnel, equipment, and supplies consistent with operational practicability.
(3) Covering essential equipment and supplies with canvas or other material for protection against contamination.
(4) Organizing unit medical, rescue, and evacuation teams.
(5) Selecting and preparing an alternate bridge site for each bridge.
(6) Organizing a radiological defense warning system.
(7) Preparing a radiological defense SOP based on that of the next higher headquarters.

d. Well-constructed foxholes 6 feet deep, 2 feet wide, and 3½ feet long with minor modification providing 1½ feet of earth cover will reduce the residual radiation to $\frac{1}{300}$ of that received in the open and is a practical solution for personnel required to remain within a contaminated area. Personnel in armored personnel carriers will receive only ¼ to $\frac{1}{10}$ of the dosage received by personnel in the open. A medium tank will reduce the dosage to only $\frac{1}{50}$ of that in the open.

134. After Burst Operations

The engineer mission, in case of an atomic attack, is expected to be essentially the same as for other types of attack, but complicated in practice by the destructive effects of atomic weapons and the additional hazards of residual radiation.

Section VIII. RETROGRADE MOVEMENTS

135. General

A retrograde movement is any movement to the rear or away from the enemy. It may be forced by the enemy or it may be made voluntarily. Retrograde movements are covered by mobile security forces which delay and deceive the enemy and prevent interference with the movement. These covering forces maintain contact with the enemy, who is forced to fight or maneuver for the ground gained. Retrograde movements include withdrawals from action, retirements, and delaying actions. For a detailed discussion on retrograde movements, see FM 17–1.

136. Engineer Support of Retrograde Movements

a. Engineers are an important element in the covering force of a retrograde movement. Their general duties are similar to those in the defense. Specific duties include—

(1) Participating in denial operations.

(2) Delaying the enemy by destroying bridges, blocking roads, demolishing railways, installation of antitank and antipersonnel minefields, and erecting barriers.

b. During retrograde movements, engineers help the other arms to impede the enemy advance as much as possible. This assistance may include any or all of the duties mentioned in *a* above. Engineers near the end of the retiring column destroy bridges and culverts, block roads, lay

mines, destroy supplies, and demolish railways and rolling stock. The time available determines the degree of destruction, and the number of obstacles created. Major obstacles must receive highest priority. Engineers work closely with other elements of the covering force, moving to the rear in leapfrog fashion. The covering force commander, responsible for delaying the enemy advance, prepares a planning table for successive withdrawals, based upon his orders from higher headquarters. Since centralized control is necessary for all elements of the covering force, the engineers are attached to and under the control of the covering force commander.

c. Engineers also assist the movement of retiring columns by performing road and bridge maintenance. Leading elements of the retiring troops must be kept moving toward their destination; routes must be kept open and clear to allow successive elements to follow. Usually supply trains, including those carrying engineer supplies and equipment, are among the first elements to move to the rear. However, to meet the needs of engineers with the security elements, it may be necessary to operate engineer supply points near the covering forces until they withdraw.

Section IX. DEFENSE AGAINST GUERILLA FORCES

137. General

a. An area menaced by guerillas is as much a combat area as a front line. Commanders and units in such an area must maintain the same

alert and aggressive attitude as front-line troops. Security measures are taken to safeguard troops, installations, and lines of communications. Vigilant security and sound defensive measures minimize friendly losses, and discourage guerilla operations. See FM's 31–15 and 31–21.

b. All troops must be trained to repel guerilla attacks and to destroy the attackers. Seldom will it be possible to divert combat forces for protection of rear areas. Armor units must make plans for ground and aerial reconnaissance of rear areas, mutual assistance by adjacent units, defense of installation perimeters, and armed escorts.

138. Troop Security

Troop security is a command responsibility. All echelons must be thoroughly briefed on known or suspected guerilla forces. Combat security measures, including extensive patrolling, are employed on the march, during halts, and in bivouac. Troops in rear areas tend to acquire a false sense of security, even though guerillas threaten them with dangers at times as great as those in forward areas. Guerilla operations are apt to be sporadic, and long quiet periods cause troops to become less alert. Commanders must exercise continuous and methodical supervision to maintain security discipline.

139. Supply Security

Commanders must constantly emphasize that supplies captured, lost, traded, stolen, or thrown

away are often recovered by guerillas and used against our forces. Arms and equipment salvaged from battlefields by civilians frequently find their way into guerilla hands.

140. Area Security

Unit areas are secured against guerilla attacks and sabotage with special attention given to the security of arms, ammunition, and other equipment of particular value to guerillas. Fields of fire are cleared and field fortifications are built and manned by adequate guards supplemented by patrols. Precautions are taken to prevent guards from being surprised and overpowered before they can give the alarm. All soldiers are trained in antiguerilla tactics, and keep their weapons available for instant use. Methods of securing an area are altered frequently, to prevent guerillas from obtaining detailed information about the composition and habits of the defense. Natives are not permitted to enter the area, and those residing in the vicinity are carefully screened or evacuated.

141. Convoy Security

a. By Armed Security Detachments.

(1) Lone vehicles, and convoys not capable of providing their own security, are grouped and escorted through danger areas by armed security detachments. These units are organized and trained to protect convoys from hostile guerilla actions, and usually contain elements of

armor, armored infantry, and engineers. The size of the detachment and its composition vary with the topography, the capabilities of the guerilla forces, and the size and composition of the convoy. Traffic through known danger areas is normally controlled by traffic control stations.

(2) The engineer element is placed well forward in the column, to perform such engineer tasks as minor bridge and road repairs, obstacle removal, and detection and removal of mines.

b. By Unit.

(1) When a convoy is not escorted through a danger area by a convoy security detachment, the parent unit organizes its own convoy security. Part of the available troops are placed well forward in the convoy, and a strong detachment rides in a vehicle or vehicles that follow the main body by about 3 minutes. Radio contact is established between the two groups, if possible. A fairly fast speed is maintained. Defiles are traversed at high speed. Sharp curves, steep grades, or other areas where low speed is enforced, are reconnoitered by foot troops sent ahead. At the first indication of ambush while the convoy is in motion, leading vehicles, if the road appears clear, increase their speed to the maximum consistent with safety, in an effort

to run through the ambush area. Drivers of vehicles disabled by enemy fire or mines try to move their vehicles to the sides or off the roads so that following vehicles are not blocked. Troops from trucks stopped in the ambush area dismount and return fire. Machine guns mounted on vehicles are fired at the enemy. Troops from vehicles that have broken through the ambush, dismount and attack rearward against the flank of the enemy. Upon learning that the main body has been ambushed, the rear guard of the convoy dismounts and attacks forward against the other flank of the enemy position. Both attacking groups take precautions to avoid firing on each other. If the guerillas allow the main convoy to pass through and then ambush the rear guard, troops from the main body return and relieve the rear guard by an attack against the flank of the ambush position.

(2) Variations of this method may be used to fit the situation, the number of troops and vehicles available, the anticipated strength of the guerilla force, and their method of operation.

Section X. DENIAL OPERATION

142. General

a. A denial operation, by removal or destruction, denies the enemy terrain or facilities that

he would otherwise capture and use. A denial operation is a responsibility of all commanders. For a commander having area jurisdiction, denial responsibility includes everything in the area; for other commanders, unless they are specifically ordered otherwise, it includes only the material and supplies assigned to their units.

b. A scorched-earth policy makes an entire area useless to the enemy by removing or destroying everything that could aid him in any way. This is denial carried to the extreme. If the area is friendly, civilians must be evacuated when the scorched-earth policy is applied. This evacuation must be strictly controlled to prevent interference with troop movements. A partial-denial operation, less drastic than the scorched-earth policy, is more often employed.

c. The theater commander decides on the extent to which denial operations will include nonmilitary supplies and facilities. When a denial policy is established, detailed planning and execution involve major problems of engineering and logistics.

143. Responsibility

The division commander is responsible for denial operations within his area. In accordance with the denial policy of higher headquarters, his plan provides for the denial of both military and civilian supplies, equipment, and installations. Denial operations are generally a major task, requiring a high degree of technical skill, and considerable time for detailed planning, careful

preparation, and execution. The engineer battalion is particularly suited for executing denial operations, and extensive use is made of engineer equipment and demolitions. Troops of other arms and services are also used. It is a command decision to determine when preliminary work is to be done and when plans will be put into effect. To be successful, a denial operation must be executed ruthlessly. Like other units, the engineer battalion has a standing operating procedure for the destruction of its own supplies and equipment.

144. Items Denied the Enemy

All possible military supplies and equipment are evacuated. The remainder is destroyed. The division and the engineer battalion are interested mostly in the denial of such items as—

a. Military equipment and installations.
b. Military supplies.
c. Communication facilities.
  (1) Railroads and rolling stock.
  (2) Airstrips.
  (3) Bridges.
  (4) Highways.
  (5) Signal communication items.
d. Certain buildings and structures.

145. Denial by Removal

Evacuation of material is as much a part of any denial operation as destruction. Evacuation must be started early and conducted in accordance with prepared priority lists. Every available

means of transportation must be used to capacity, to save as much supplies and equipment as possible.

146. Denial by Destruction

a. All possible methods of destruction are used. The most common are—

(1) Fire.
(2) Flooding or drenching.
(3) Mechanical methods, such as breaking with a sledge hammer or cutting with an oxyacetylene torch.
(4) Explosives (FM 5–25).
(5) Contamination.
(6) Projectiles: small arms, artillery, and bombs.

b. So that destruction may be executed at the desired time, personnel to destroy each item must be designated in advance; supplies necessary for the destruction must be estimated and assembled at convenient locations; circumstances under which the destruction is to take place must be definitely prescribed; and, if orders for destruction are to be issued, the means of transmission must be provided.

147. Use of Prepositioned Atomic Weapons

a. Prepositioned atomic weapons may be used for denial operations. Normally the officer responsible for the execution of an atomic demolition mission will be the commander of the engineer emplacement and firing unit. The designated commander should be highly trained in all

aspects of atomic weapons operations which are the responsibility of engineer personnel. He ordinarily directs all operations at the emplacement site, takes emergency action in the event of a change of mission or misfire, and detonates the atomic weapon on order from higher headquarters.

b. Engineer personnel prepare the emplacement site under the direction of the engineer emplacement site commander. This may include providing appropriate access roads, installing antitank and antipersonnel minefields or other obstacles when ordered, camouflaging the area to avoid disclosure of the operations, providing local security, and providing communication facilities. Engineer personnel install the atomic weapon in the emplacement and complete all preparation of the weapon and site.

Section XI. RIVER-CROSSING OPERATIONS

148. General

a. Scope. This section presents a general discussion of river-crossing operations, and the tactics and techniques of the armored engineer battalion in these operations. Since the armored division is seldom employed in the assault phase of a deliberate river crossing, detailed information is not given. Detailed information on deliberate river crossings may be obtained from FM's 7–40, 31–60, and 100–5.

b. Object and Mission. The immediate objects of an attack on a river line are to get across

quickly and economically, and establish one or more bridgeheads to protect the crossing of the remainder of the command. A division usually crosses as part of a larger force. The infantry division usually has one of the following missions: to force the main crossing, to make a secondary crossing, or to make a feint. The armored division, however, is normally a passenger in a deliberate crossing since it is better suited for breaking out of a bridgehead than for forcing a crossing.

149. Types of Crossings

Plans for crossing a stream when all bridges have been destroyed depend upon the strength with which the enemy holds the opposite bank, and the characteristics of the river. There are two general types of crossings—a deliberate river crossing, and a hasty river crossing.

150. Deliberate River Crossing

a. A deliberate river crossing is necessary if the opposite bank is strongly held or if the natural obstacle is technically difficult. Detailed planning, extensive logistical preparation, and air and ground superiority are required. Overall planning and coordination are performed by corps or higher commands.

b. The armored division engineer battalion, in a deliberate river crossing, is normally held out to provide engineer support when the division is committed on the far shore. Some elements of the battalion may be used to operate assault boats

during the assault phase or to perform preliminary work on bridge approaches or access roads before the assault. In any case, amored division engineers must not be employed where they cannot be withdrawn to accompany the armored division over the river and to provide forward engineer support for combat commands. The organic bridging of the battalion is also held out for support of the combat commands when they are committed on the far shore. Extensive operations require backup support from corps or army in the form of additional fixed, floating, and assault bridging equipment and units.

151. Hasty River Crossing

The hasty river crossing is normal for the armored division. It must be boldly executed, to insure surprise and to prevent the organization of strong defense. Detailed reconnaissance and planning are secondary to speed. The one vital consideration is that the tempo of the advance of the armored division must not be disturbed. Frequently, aggressive action will result in the capture of a bridge before the enemy has destroyed it. At other times a damaged bridge can be repaired, a ford can be found and improved, or a ferry service can be established, using local boats and barges. Advance elements get across by expedient means, if normal bridging and equipment are not available. Hasty crossings must be anticipated, and all available river-crossing equipment must be well forward and used promptly. When the opportunity for such a

crossing is presented to an advance force, supporting engineer troops assist in the immediate crossing and exploitation. The armored division engineer battalion constructs bridges and other necessary crossing means as soon as possible, to cross additional divisional troops that are rushed forward to expand the initial successes.

152. Crossing Means

a. Every available crossing means is used to cross the maximum number of troops and equipment in the shortest time. If necessary after the first objective is achieved, rafts or expedient bridges are constructed by the amored division engineer battalion. These are used to cross tanks, additional personel, ammunition, heavy weapons, equipment, and necessary vehicles to support the bridgehead and to expand it to the second objective. Construction of fixed or floating bridges is usually started when the second objective is attained, or before, if enemy artillery fire is light. Achievement of the third objective coupled with local air supremacy, permits the completion of the bridge or bridges, their uninterrupted use in crossing the rest of the division, and the exploitation of successes already attained.

b. If the bridging is left in place, the bridge company immediately obtains replacement bridging from the nearest engineer depot and rejoins the supported unit. On the other hand, although infrequently, the bridging may be disassembled by one of the armored division engineer lettered companies, and reloaded on the bridge trucks,

which return to the supported unit for the next bridging operation.

153. Desirable River-Crossing Characteristics

The following desirable characteristics are sought in river-crossing operations:

a. Assault-boat crossing sites are located, if possible, where the current is moderate, and the banks gently sloping. There must be adequate space for simultaneous launching of the desired number of boats. Concealment is desirable for approaches to the launching sites, and for the sites themselves. Frequently, lanes must be cleared and marked to allow movement of boats.

b. Raft sites are normally located downstream from bridge sites, and should be close to existing roads at points where the current is moderate and where banks can accommodate two or more rafts without landing stages.

c. Floating-bridge sites should have—

(1) Short, easily constructed approach roads to existing road nets on both sides.

(2) Moderate current.

(3) Firm stream banks that can support abutments.

(4) Nearby points where floats may be inflated and launched. Normally, pontoons are launched downstream of the bridge site. When tributary streams exist, it may be desirable to float pontoons to the bridge from launching sites on the tributary.

(5) Turn-arounds for vehicles at unloading points.

(6) Large trees or other natural anchorages for anchor cable, when used.

(7) Small variations in water level. Allowances must be made for changes in water level and velocity of current caused by floods and tides, particularly for their effect on the required anchorage.

Section XII. INFANTRY COMBAT

154. General

a. In carrying out their mission, armored division engineers frequently become involved in combat. They may fight to maintain their own security while on the march, in bivouac, or at work. In this type of combat, engineers usually fight in small units of a squad or platoon. In emergencies, combat engineers may be relieved of their engineer work and assigned an armored infantry combat mission. In such a case, the unit staff engineer must advise his commander as to the effect that stopping engineer work will have on the mission of the supported unit. In exploitation missions, and before arrival at the combat command objectives, the combat command commander may require the attached engineer company to guard a sector of the perimeter during extensive halts, or at night.

b. The basic tactics of engineers engaged in combat are those of infantry. Armored division engineer units have less combat effectiveness than

infantry units because their equipment, available supporting weapons, and facilities are fewer, and their infantry combat training is not as extensive. For this reason, engineers committed to combat are used primarily in the defense rather than in the offense. To compensate in part for these disadvantages, engineer units are assigned smaller frontages than armored infantry units of corresponding sizes, and should be provided with fire support from heavy infantry weapons. To insure coordination of supporting fires, engineer units are usually attached to larger armored infantry units.

c. Training of armored division engineer units in infantry tactics is based on a plan or SOP covering reorganization for combat. Emphasis is placed on training company officers in the proper employment of supporting mortar and artillery fires. See FM's 17–1 and 17–20.

d. Reorganization of the armored division engineer battalion for infantry combat is normally limited to the battalion less the bridge company. The bridge company usually is not reorganized. It remains intact, subject to call by the division engineer, for assignment to division engineer missions. Detachments from the headquarters company may also be used on engineer missions.

155. General Organization for Combat

a. Modification of Normal Organization. When reorganized for infantry combat, the armored division engineer company is capable of furnish-

ing command, rifle, and crew-served weapons elements (app. III). Normal organization is modified to provide effective use and control of crew-served weapons, for security of equipment not needed for combat, and for the special requirements of command, communication, and supply in combat. A standing operating procedure for reorganization is set up by the lettered companies and their platoons to establish definite duties for all personnel.

b. Extent of Reorganization. The extent of reorganization for combat varies with the size of the unit, the time available, and the mission. When engineers are deliberately committed to combat, there is usually time to reorganize before meeting the enemy. Rifle companies are formed, each with a headquarters and three rifle platoons. The platoons consist of a platoon headquarters and three rifle squads. When a platoon operating alone becomes involved in combat, however, reorganization must be based on fragmentary orders issued after contact, and must be carried out gradually as opportunity presents itself. Armored engineer units from company to battalion are organized into combat and trains elements.

c. Combat Element. The combat element contains those elements actually engaged in combat and the personnel, equipment, and vehicles necessary for the command control of the combat units.

d. Trains Elements. The trains elements consist of combat trains and field trains.

(1) The combat trains consist of the supply

and maintenance personnel, equipment, and vehicles necessary for the immediate support of combat units. The combat trains are normally located in the immediate vicinity of battalion and/or company command posts.

(2) The field train is commanded by the senior officer or enlisted man present. It consists of personnel and equipment not needed for combat, including kitchen trucks, trucks carrying supplies and equipment, and such special vehicles as air compressors, bridge trucks, cranes, tractors, and other heavy equipment. The number of personnel assigned is the minimum necessary to maintain the mobility of the field trains, provide for its local security, and perform essential administrative and service functions. The field trains will be located in the trains area of the combat command to which the engineer unit is attached.

e. Engineer Operations. Certain types of engineer work, such as water supply, supply of engineer materials, and engineer reconnaissance must be continued by trains elements.

156. Support Fire Power and Communication Facilities

a. Effective use of engineer units on an infantry combat mission can be increased with additional fire power and means of communication furnished by other units in the combat command. Fire support is best accomplished when amored

division engineer units are attached to an armored infantry battalion, and employed as part of a combat command. The armored infantry battalion commander is then responsible for furnishing supporting fires. Forward observers from artillery and mortar units join engineer units employed on the front lines. Additional antitank protection is also provided by the armored infantry battalion commander.

b. The engineer unit enters the radio net of the unit to which attached. The use of prearranged signals is coordinated. In static situations, wire communication may be established. In addition, the use of messengers and sound and visual signals is necessary. Whenever possible, supporting artillery units will continue their wire net down to each deployed engineer company. Details of signal communication in the armored division are found in FM 17–70.

CHAPTER 7
CONDUCT OF TRAINING

Section I. GENERAL

157. General

This chapter outlines the training required to form an efficient armored division engineer battalion. Training is progressive, from basic and advanced individual training through unit and combined training. It must be kept in mind that training never ceases—before, during, and after combat—and that the ultimate goal of all training is success in battle.

158. Responsibility

a. Commanders of all echelons are responsible for training engineer troops assigned or attached to their commands. The armored division engineer battalion commander is responsible for training his battalion, and company commanders are responsible for training their companies. The battalion S3 plans and prepares detailed training schedules for the companies, and makes recommendations to the battalion commander for their application. He also establishes battalion-level schools for officers, noncommissioned officers, and specialists.

b. As a general guide, subject to modification imposed by division training directives, training normally follows the army training programs

(ATP's) provided by the Department of the Army. Throughout all training, the application of prior instruction to current training is stressed. Skills once learned must not be allowed to go unused, but must be applied whenever possible, and concurrently with other training.

Section II. TRAINING MANAGEMENT

159. Preparation

Every effort must be made to insure that instruction, whether in the classroom, in the field, or on the job, is carefully prepared and effectively presented. Fundamental training doctrines and principles are outlined in FM's 21–5 and 100–5, and TF's 21–2301 through 21–2306. Detailed instructions for engineer training are presented in field manuals, technical manuals, and army training programs of the 5-series. Special training instructions are published in training circulars and periodic training directives. Department of the Army publications, training films, film strips, and graphic training aids are listed in DA Pamphlets 310–3, 310–4, 310–5, and 108–1. Additional training aids should be prepared as necessary to accomplish the training mission.

160. Equipment

Newly-activated engineer units are normally furnished enough equipment to permit effective training. If the equipment is inadequate, every effort must be made through proper supply channels to obtain whatever is necessary. If needed

equipment is still not available, expedients are constructed and used. The training schedule is arranged so that available equipment can be rotated among using units.

161. *Training Time*

A general breakdown showing total time to be devoted to each subject in a 44- or 48-hour week is given in army training programs. This is the minimum training week. Night operations, bivouacs, and field exercises ordinarily require much additional time. Specific information on the prescribed number of weeks and basic, unit, and combined unit training periods is published from time to time by the Department of the Army.

162. Training Areas

Although some engineer training can be conducted almost anywhere, a training area should approximate the terrain and climate of the probable theater of operations. Large training areas are necessary so that training in such subjects as explosives and demolitions can be safely isolated. Training areas should contain a wide variety of soil and terrain conditions; numerous types of roads and bridges; several kinds and sizes of standing timber; and lakes and gullies of various types and widths.

163. Supervision

Training requires active personnel supervision by higher echelon commanders and their staffs, as well as by the battalion commander and his

staff. Each company commander constantly supervises the training of his unit. Administrative personnel must perform their work correctly and promptly, so that details and backlog do not interfere with training. If the battalion commander has a competent administrative staff, he can devote most of his time to the supervision of training, and a minimum to administrative details.

164. Inspections

a. Each command level is responsible for the training of its subordinate units. Frequent training inspections are made to check on the progress of training, and to determine what must be stressed to meet required standards. Inspections cover all phases of training. Engineer soldiers are first tested on their military and technical proficiency, and then on their abilities as members of an engineer unit. Actual successful performance by the trainees is the only true test of training.

b. Inspecting officers must be just, impartial, and constructive in their criticism. They must help and teach, as well as uncover faults. Inspections are timed to avoid interfering with the training program. In this connection, it is desirable for several inspectors to conduct their inspections simultaneously.

Section III. TRAINING PHASES

165. Essential Training Phases

a. Filler personnel assigned to the battalion

from reception centers receive basic combat training applicable to the Army as a whole. The subjects introduced during this phase are common to all soldiers regardless of arm or service.

b. The training program for a newly-activated armored division engineer battalion is outlined in ATP 5–300. This program covers the cadre, individual, and unit training phases, from the time the cadre is assembled until the battalion enters field exercises with the armored division.

166. Concurrent Training

a. General. To make training more realistic and effective, arbitrary boundaries between training phases must be avoided. Each subject is related to other subjects, and all subjects are integrated into the team mission. This entails, to some degree, conducting basic and advanced individual, specialist, and unit training concurrently. Reviews of basic subjects are incorporated regularly in the progressive training phases. In many technical exercises, tactical requirements are included, such as providing security for bridge construction projects, and the protection of working parties and obstacles from both ground and air attack. Throughout all phases of training, and particularly during unit training and field exercises, initiative and a sense of responsibility must be developed in officers, noncommissioned officers, and others who show potential leadership ability. Each commander includes leadership exercises in all training phases, particularly during periods of tactical and technical training. Com-

mand is decentralized, and interference with subordinate commanders is kept to a minimum. Everyone is instilled with the importance of making decisions and acting quickly in emergencies not covered by specific orders.

b. Supply Economy. Throughout all training, every opportunity is used to stress supply economy. All engineer personnel must be trained to understand that supply is a crucial factor, particularly in theaters of operations. There must be continuous training and supervision in the conservation, care, and maintenance of supplies and equipment. Definite responsibility is fixed for each item of equipment and supply, in storage or in use. Continued aggressiveness by all commanders and supply personnel is required to stress supply economy and the proper care of government property.

c. Defense Against Atomic Weapons. All military personnel receive orientation in defense against atomic weapons. Unit radiological defense specialists receive additional indoctrination and training in unit schools or in radiological defense schools conducted at a higher level. Courses of instruction and training phases are described in SR 350–110–1, DA Pams 39–1 and 39–3, and DA TC 3–2. In addition to required indoctrination courses, unit commanders encourage frank and open discussions of unclassified atomic energy information in troop information programs and similar conferences. This instills the proper respect for atomic weapons, and also refutes irresponsible and misleading rumors.

d. Staff Sections and Administrative Personnel. The engineer battalion must have well-trained and highly-coordinated staff and administrative sections. See chapter 2 of this manual, and FM 101–5). Their training, both individually and by sections, is continuous. Additional individual training may be received in special schools conducted by battalion or higher headquarters. Standing operating procedures (SOP's) for these elements, as well as for the operating echelons, are established at the command level, where they can be coordinated with SOP's of higher echelons. Imagination, initiative, realism, and close supervision are necessary in training this type of personnel.

e. Tactical Training. Closely tied-in to all engineer training is progressive instruction in combat principles, applied particularly in conjunction with security on the march, in bivouac, and at work sites. Infantry methods and formations, prescribed in FM's 7–10, 7–15, 7–20, and 21–5, should be used as a guide, but they must be adapted to engineer strength, armament, and organizations. Typical reorganization of armored engineers for combat as infantry is shown in appendix III.

Section IV. COMPANY TRAINING

167. Combat Company Training

a. The company commander plans his training program in accordance with battalion training directives and policies. Proficiency in basic engineering subjects is stressed. Platoon commanders

train their own platoons in most subjects, instead of each company officer teaching a separate subject to the entire company. Full advantage is taken of various school quotas for the training of specialists.

b. Company training is of two types. In one type the whole company is engaged on the same project, and all the elements of the company learn to work together as a team. This is practicable for such subjects as infantry combat and construction, particularly expedient road and bridge construction and repairs. In the other type of training the platoons work on different tasks and the command, mess supply, equipment and maintenance, and communication sections learn how to support these work elements most effectively. This type of company training is practicable for any subject. Both types are vital to the successful operation of the company.

168. Bridge Company Training

The bridge company commander is responsible for the training of his company, and for the training given to individual platoons. Company training is primarily directed toward insuring that all platoon personnel are proficient in loading and unloading, maintaining, and erecting stream-crossing equipment. Training in day and night convoy operation is also best conducted at the company level. Most of the training is concerned with the specialized interests of the platoons and sections. Because members of the platoon often work away from the platoon, they must be

thoroughly trained in day and night convoy and bridging operations, and in independent missions.

a. Bridge Platoon Training. Basic training follows the standard pattern. Advanced individual training requires more training time for a bridge platoon than for many other units, because of the heavy individual responsibilities. All members of the platoon must be competent truck drivers, and should be well trained in driver maintenance, emergency repairs, day and night convoy operations, vehicle camouflage, map reading, and driving. In addition, they must be able to fire the .30-caliber machine guns and the grenade launchers, as well as their individual weapons. They may have to operate a hand radio set, to identify and make elementary repairs to all component parts of the bridge, and to act as bridge guards. Members of each platoon must know how to load and unload all parts of the bridge section carried by their sections. Key personnel must know the loading plans. All key personnel must be able to operate the outboard motors and assault boats. Motorboat operators must receive sufficient training to make necessary repairs to assault boats. Unit training stresses convoy operations, loading plans, bridge construction and dismantling, and security.

b. Equipment and Maintenance Section Training. Certain basic differences between the motor sections of the lettered companies and the bridge company are reflected in the training given to the equipment section of the bridge company. There are no armored vehicles in the bridge company,

which reduces the number of projects that the motor sergeant must supervise. The large number of vehicles needed promptly when a bridge is erected increases the importance of careful scheduling of maintenance and inspection. Convoy discipline in both day and night operations must be highly emphasized in the training of this platoon.

Section V. TRAINING OF OTHER TROOPS IN ENGINEER SUBJECTS

169. Training of Other Arms and Services

a. The engineer battalion is sometimes called upon to conduct a demonstration of mine laying, mine clearing, or bridge construction for non-engineer troops of the division. Such demonstrations are usually staged by squads or platoons. The battalion frequently furnishes individual instructors in engineer subjects for the training of other troops. Subjects taught include mine warfare, use of explosives, camouflage, rigging, field fortifications, and bridge and road building expedients. Instructors are usually selected from the officers or key noncommissioned officers of the lettered companies.

b. When an armored division is activated, individuals and small units receive separate training. Then, when they have become reasonably proficient, combined unit training starts. The engineer company commander acts as engineer advisor to the combat command commander. When deficiencies in the engineer training of the non-

engineer units of the command develop, the company provides additional training. The engineer company commander should insure that commanders of other units within the combat command understand the mission and capabilities of the armored division engineers.

170. Comparison With Other Engineer Combat Battalions

Although generally similar, the organizations of the engineer battalions do vary with the three types of divisions—airborne, armored, and infantry. The principal differences are in bridging equipment and personnel strength. Refer to FM 5–132 for details of Infantry Division Engineer Battalion (ROCID). The armored division engineer battalion has increased cross-country mobility and stream-crossing capability provided by the armored personnel carriers.

APPENDIX I
REFERENCES

1. Publication Indexes

The following publications should be consulted frequently for latest changes to, or revisions of publications given in this list of references, and for new publications on the subject covered in this manual:

DA Pam 108–1 Index of Army Motion Pictures, Film Strips, Slides and Phono-Recordings.
310–1 Index of Administrative Publications.
310–3 Index of Training Publications.
310–4 Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
310–5 Index to Graphic Training Aids and Devices.
320–1 Dictionary of United States Military Terms for Joint Usage.

2. Army Regulations and Special Regulations

a. Army Regulations.

AR 40–205 Military Hygiene and Sanitation.
105–15 Field Signal Communications.

AR 165–15	Functions of Chaplains, Commander's Responsibility and Reports.
220–60	Battalions — Battle Groups — Squadrons; General Provisions.
220–70	Companies; General Provisions.
320–50	Authorized Abbreviations.
380–5	Safeguarding Defense Information.
385–10	Army Safety Policy.
643–55	Disposition of Personal Effects; Military Operations.
700–2300–1	Motor Vehicles.
750–5	Maintenance Responsibilities and Shop Operations.

b. Special Regulations.

SR 55–720–1	Preparation for Oversea Movement of Units (POM).
55–720–2	Movement of units within continental United States.
320–5–1	Dictionary of United States Army Terms.
525–45–1	Combat Operations, Command Reports.

3. Field Manuals

FM 3–5	Tactics and Technique of Chemical, Biological, and Radiological Warfare.

FM 3–50	Chemical Smoke Generator, Battalion, and Chemical Smoke Generator Company.
5–5	Engineer Troop Units.
5–6	Operations of Engineer Troop Units.
5–10	Routes of Communications.
5–15	Field Fortifications.
5–20	Camouflage, Basic Principles.
5–22	Camouflage Materials.
5–23	Field Decoy Installations.
5–25	Explosives and Demolitions.
5–31	Use and Installation of Booby Traps.
5–34	Engineer Field Data.
5–35	Engineer's Reference and Logistical Data.
5–36	Route Reconnaissance and Classification.
6–20	Artillery tactics and technique.
6–101	The Field Artillery Battalion.
6–135	Adjustment of Artillery Fire by the Combat Soldier.
7–10	Rifle Company, Infantry Regiment.
7–15	Heavy Weapons Company, Infantry Regiment.
7–21	Headquarters and Headquarters Company Infantry Division Battle Group.
7–24	Communication in Infantry and Airborne Divisions.

FM 7–25	Headquarters Company, Infantry Regiment.
7–30	Service and Medical Companies, Infantry Regiment.
7–35	Tank Company, Infantry Regiment.
7–40	Infantry Regiment.
8–10	Medical Service, Theater of Operations.
8–35	Transportation of the Sick and Wounded.
9–6	Ordance Ammunition Service in the Field.
10–63	Handling of Deceased Personnel in Theaters of Operations.
16–5	The Chaplain.
17–1	Armor Operations Small Units.
17–20	Armored Infantry Units, Platoon, Company, and Battalion.
17–33	Tank Platoon, Company, and Battalion.
17–50	Logistics, Armored Division.
17–70	Signal Communications in the Armored Division.
17–79	Tank, 90-mm Gun, M48.
17–100	The Armored Division and Combat Command.
20–32	Employment of Land Mines.
20–100	Army Aviation.
21–5	Military Training.
21–6	Technique of Military Sanitation.
21–10	Military Sanitation.

FM 21–11	First Aid for Soldiers.
21–26	Map Reading.
21–30	Military Symbols.
21–40	Defense Against CBR Attack.
21–41	Soldier's Manual for Defense Against CBR Attack.
21–48	CBR Training Exercises.
21–60	Visual Signals.
22–5	Drill and Ceremonies.
22–10	Leadership.
22–100	Command And Leadership for the Small Unit Leader.
24–5	Signal Communications.
24–18	Field Radio Techniques.
24–20	Field-Wire Techniques.
25–10	Motor Transportation, Operations.
26–5	Interior Guard.
30–5	Combat Intelligence.
30–7	Combat Intelligence; Regiment, Combat Command, and Smaller Units.
30–15	Examination of Personnel and Documents.
31–10	Barriers and Denial Operations.
31–15	Operations Against Airborne Attack, Guerilla Action, and Infiltration.
31–21	Guerilla Warfare.
31–25	Desert Operations.
31–50	Combat in Fortified Areas and Towns.

FM 31–60	River-Crossing Operations.
31–70	Basic Arctic Manual.
31–71	Operations in the Arctic.
57–20	Airborne Techniques for Divisional Units.
57–30	Airborne Operations.
60–5	Amphibious Operations; Battalion in Assault Landings.
70–10	Mountain Operations.
72–20	Jungle Operations.
100–5	Field Service Regulations; Operations.
100–10	Field Service Regulations; Administration.
100–31	Tactical Use of Atomic Weapons.
101–5	Staff Officers' Field Manual; Staff Organization and Procedure.
101–10	Staff Officers' Field Manual; Organization, Technical, and Logistical Data.
101–31	Staff Officers' Field Manual; Atomic Weapons Employment (U).

4. Technical Manuals

TM 3–220	Decontamination.
5–220	Passage of Obstacles Other Than Mine Fields.
5–223	Foreign Mine Warfare Equipment.
5–226	Carpentry.
5–235	Special Surveys.

TM 5–248 Foreign Maps.
5–271 Light Stream-Crossing Equipment.
5–272 Widened Steel Treadway Bridge.
5–278 Outboard Motors.
5–295 Military Water Supply.
5–725 Rigging.
5–727 Engineer Hand Tools.
9–738 Tank Recovery Vehicles M32, M32B1, M32B2, M32B3, and M32B4.
9–2810 Tactical Motor Vehicle Inspections and Preventive Maintenance Services.
9–7012 90-mm Gun Tanks M48 and M48A1.
9–7426 Tank Mounting Earth Moving Bulldozer M6.
21–305 Manual for the Wheeled Vehicle Driver.
38–660–1 Operator's Maintenance Instructions and Procedures for Administrative Motor Vehicles.
57–210 Air-Movement of Troops and Equipment.

5. **Technical Bulletins**

ENG 117 Field Fortifications.

6. **Training Circulars**

TC 10, 1954 Demolition With Atomic Weapons (U).
TC 110–5 Joint Training Directive for Air-Ground Operations.

7. **Table of Allowances**

TA 23–100 Ammunation for Training.

APPENDIX II

RECOMMENDED OUTLINE FOR AN SOP

(To be used as a checklist)

HEADQUARTERS
--th ARMORED DIVISION ENGINEER
BATTALION

DATE:

STANDING OPERATING PROCEDURE
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(1) When (situation for which required).

(2) How (organized).

(3) Personnel and equipment.

8. STAFF DUTIES

a. Duties that are special or additional to those in FM's 5–134 and 101–5.

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b. Special

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(1) Title and reports control symbol.

(2) Form for report.

(3) Date due.

(4) Number of copies.

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b. Enlisted (AR 624–200)

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   b. Procedure for submitting cases.
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   b. Authority to grant.
16. JOURNALS AND HISTORY (AR's 220–345, 220–346, SR 600–730–5)
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   b. Maintenance of staff section journals.
17. DISTRIBUTION OF MILITARY PUBLICATIONS (AR 310–1)
18. HANDLING OF PRISONERS OF WAR (DA Pam 20–151)
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   b. Special instructions for capturing units.
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23. MOTOR MOVEMENT (FM 25–10 and AR 55–355)
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        (1) Strip maps.
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        (6) Distances to be maintained.
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    b. Regulations for administrative vehicles.
25. RAIL MOVEMENTS (AR's 55–130 and 55–355)
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        (1) Movement policy.
        (2) Troop lists.
        (3) Designation of movement control personnel.
    b. Action by S2.

(1) Railroad reconnaissance report.
(2) Security.

c. Action by S3.
(1) Determine rolling-stock requirements.
(2) Coordinate loading plans.
(3) Prepare loading schedule and designate areas.

d. Action by S4.
(1) Initiate transportation requests.
(2) Troop and guard mess.
(3) Procurement of blocking and dunnage.
(4) Prepare shipping documents.

26. AIR MOVEMENTS (AR's 55–42 and 55–355)

a. Action by S1 (same as par. 25*a*).

b. Action by S2.
Security

c. Action by S3.
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(2) Coordinate loading plans.
(3) Prepare loading schedule and designate loading areas.
(4) Instruct necessary personnel in air transportability technique.

d. Action by S4.
(1) Initiate transportation requests.
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(3) Furnish weights of equipment for loading computation.
(4) Arrange for any necessary Air Force supplies.
(5) Prepare shipping documents.

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a. Action by S1 (same as par. 25*a*).

b. Action by S2 (same as par. 25*b*).

c. Action by S3.

(1) Determine shipping required.

(2) Coordinate loading plans.

(3) Prepare loading schedule and designate loading areas.

d. Action by S4.

(1) Initiate transportation requests.

(2) Provide for troop mess.

(3) Prepare shipping documents.

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(3) Chemical, bacteriological, and atomic (sec. X).

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   c. Tactical.
9. SUPPLY
   a. Emergency requisitions.
   b. Authorized levels of CBR equipment.

10. TRAINING

See Division Training Directive No._____

BY ORDER OF LT COLONEL MOYER

/s/ Dean Ludwig
/t/ DEAN LUDWIG
Capt CE
Adjutant

OFFICIAL

/s/ Dean Ludwig
/t/ DEAN LUDWIG
Capt CE
Adjutant

DISTRIBUTION:

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APPENDIX III

REORGANIZATION OF ARMORED DIVISION ENGINEER BATTALION FOR COMBAT AS INFANTRY

Section I. GENERAL

1. Purpose

This appendix is intended to serve as a guide for the reorganization of armored division engineer units when the tactical situation requires their use in combat as infantry. It includes the formation of a combat element of personnel, weapons, and equipment for combat employment as provisional infantry units. The trains element is organized to support the combat employment of the combat element (fig. 23). It may, in addition, be required to provide elements of the battalion for normal engineer missions. This will especially be true of the bridge company, which will usually be retained on engineer tasks. The reorganization plan is intended to make the most effective use of the available personnel, equipment, and organic weapons for a combat role. It is based on TOE 5–215, ROCAD, 1 December 1956. The plan may be modified if necessary to meet the actual tactical situation and the current unit strength and weapons available. Any variation caused by reduced strength should, if practicable, be at the expense of the trains element.

2. Alert

All personnel of the battalion are alerted as soon as orders are received from higher head-

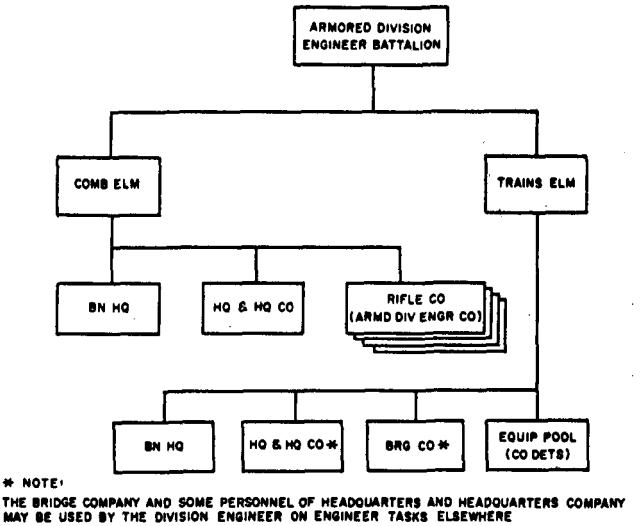

Figure 23. Reorganization of the Armored Division Engineer Battalion.

quarters to commit the battalion as infantry. Upon receipt of such an alert, the reorganization plan becomes effective. Each company commander prepares, in advance, an SOP designed to effect the reorganization of his company as required in the battalion SOP.

3. Weapons

All weapons, both individual and crew-served, organic to the units of the battalion, are utilized. In such an emergency, it cannot be assumed that additional weapons from other components of the armored division will be available for issue.

4. Engineer Work

When the battalion is committed as infantry, engineer work plans are greatly curtailed.

a. Engineer supply and maintenance, map supply, and water supply, and limited engineer reconnaissance are continued even when engineer work is curtailed.

b. If engineer work is continued, although drastically curtailed, it would usually be assigned to the bridge company and to detachments from the headquarters and headquarters company. If more engineer work is deemed essential, a lettered company may be required.

5. Training

During all combat training exercises, the plan for reorganization of the battalion is effective.

6. Support by Trains Elements

a. The engineer battalion combat support systems include combat trains and field trains.

(1) Combat trains include the necessary supply, maintenance, and medical personnel, equipment, and vehicles for the immediate support of combat elements. The combat trains will be located in the vicinity of the battalion and/or company command posts, depending upon whether the battalion is operating as a unit or whether companies are operating alone or attached to combat commands.

(2) Field trains include all personnel, equipment, and vehicles not in either the com-

bat element or combat trains. The location of the field trains is based on the following considerations:

(*a*) When an armored division engineer company, operating as infantry, is attached to an armored infantry battalion, the company's field trains will be located with the engineer battalion field trains.

(*b*) When the armored division engineer battalion, operating as infantry, is employed as a unit the armored engineer battalion's field trains will be located in the combat command trains of the combat command to which the battalion is attached.

(*c*) The bridge company less those elements in support of combat commands, the field maintenance platoon, the equipment platoon and certain heavy equipment from engineer companies will be located in division trains.

(3) For a detailed discussion of combat and field trains operation see FM 17–50.

7. Fire Support From Either Units

See paragraph 156.

8. Communications

See paragraph 156.

9. Individual Equipment

Each individual prepares full field equipment for retention. All other individual equipment is

stored with trains element until released by the battalion commander.

Section II. REORGANIZATION OF ARMORED DIVISION ENGINEER SQUAD

10. Trains Element

The squad trailer, tools, and organic and individual equipment that are not needed for actual combat are assigned to the platoon trains which in turn joins the company trains element.

11. Combat Element

Four men are released to platoon headquarters for the organization of a provisional weapons squad. The remaining eight men are organized into a rifle squad (fig. 24).

	INFANTRY JOB	WEAPON	ENGINEER JOB
1.	SQUAD LDR	RIFLE	SQUAD LDR
2.	RIFLEMAN	RIFLE & GRENADE LCHR	COMBAT CONST SPECL
3.	RIFLEMAN	RIFLE & GRENADE LCHR	PIONEER
4.	MACHINE GUNNER	RIFLE & 30 CAL MG	COMBAT CONST SPECL
5.	ASST MACHINE GUNNER	RIFLE	PIONEER
6.	RKT LCHR GUNNER	RIFLE & RKT LCHR	COMBAT CONST SPECL
7.	ASST RKT LCHR GUNNER	RIFLE	PIONEER
8.	ASST SQUAD LDR	RIFLE & GRENADE LCHR	ASST SQUAD LDR

Figure 24. Typical reorganization of the armored division engineer squad.

Section III. REORGANIZATION OF ARMORED DIVISION ENGINEER PLATOON

12. Trains Element

Trains elements of the platoons (fig. 25) may be grouped at company or battalion level if the battalion is committed as a unit. If the companies are attached to the combat commands, grouping takes place at either battalion or combat command trains. The platoon trains element consists of one truck driver (from platoon headquarters), one pioneer (one of the 12 men furnished by the squads), platoon tools and equipment, and the following vehicles:

4 Trailers, cargo, 1½ ton (3 from the squads)
1 Trailer, 2 wheel, pole-type, 2½ ton
2 Trucks, dump, 2½ ton

13. Combat Element

a. Rifle Squads. See figure 24.

b. Platoon Headquarters. Platoon headquarters consists of the platoon leader, platoon sergeant, radio operator-driver, messenger (one of the 12 men furnished by the squads), and ¼-ton truck.

c. Weapons Squad. The weapons squad consists of the .50 cal machine gun which is organic to platoon headquarters and the 3 personnel carriers with .50 cal machine guns which are organic to the squads. Gunners and drivers (assistant gunners) are furnished by the squads. One assistant squad leader is appointed weapons squad leader and is in turn replaced by the toolroom keeper. The weapons squad leader is assisted by

one of the 12 men furnished by the squads. The .30 cal machine guns and rocket launchers remain organic to the squads.

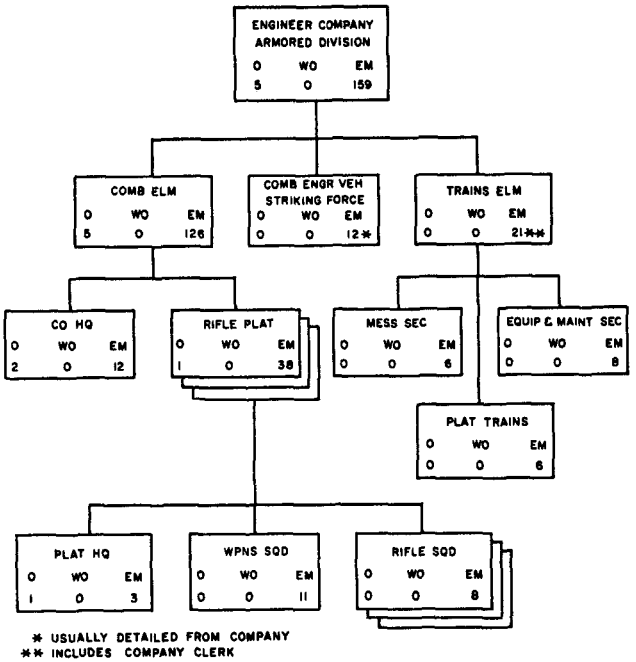

Figure 25. Typical reorganization of the armored division engineer platoon.

d. Combat Engineer Vehicles. If the battalion is committed as a unit, the combat engineer vehicles from all the platoons are grouped into a striking force at battalion level and are to be employed as directed by the battalion commander. One of the reconnaissance officers can be appointed leader of this force. If the companies are attached to combat commands, the 3 combat engi-

neer vehicles are grouped into a provisional platoon under command of the company executive officer.

Section IV. REORGANIZATION OF ARMORED DIVISION ENGINEER COMPANY

14. Trains Element

a. Personnel. The company trains element (fig. 26) is commanded by the senior noncommissioned officer. It consists of 15 men from company headquarters and 6 men and equipment from the platoon trains. The personnel from company headquarters are—

Administrative Section	1—Company clerk.
Mess Section	6—Entire section.
Equipment and Maintenance Section.	8—Entire section less 4 drivers.

b. Equipment. Major items of company headquarters equipment in the trains element are—

1 angle dozer, cable operated
1 compressor, air
1 tractor, full tracked
1 semitrailer, 25 ton
1 trailer, ¼ ton
1 trailer, 1½ ton
1 trailer, water
1 truck, dump, 2½ ton
1 truck, wrecker, 5 ton
1 truck, tractor, 5 ton

c. Operations. Depending upon the amount of dispersion in operations, the company trains element may be separate, or it may be grouped with the battalion or the combat command trains ele-

ment. The mission of the trains element is to support the company operations and to provide security for the trains.

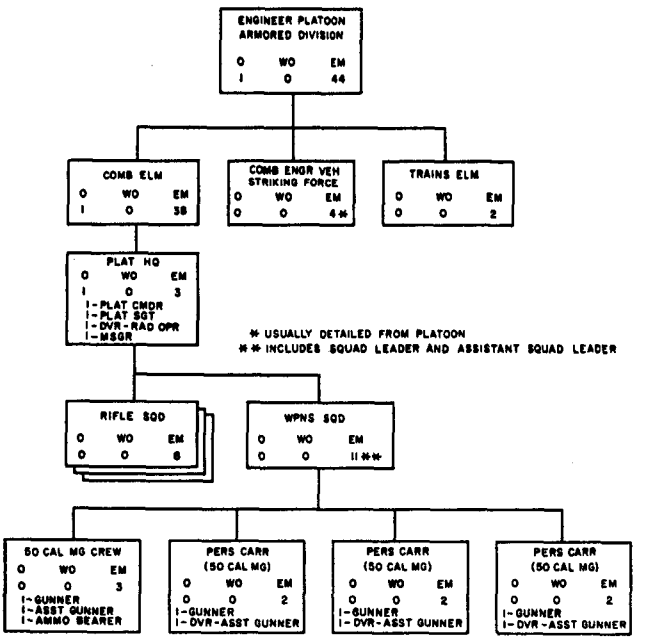

Figure 26. Typical reorganization of the armored division engineer company.

15. Combat Element

a. General. The combat element of company headquarters consists of 5 officers and 126 enlisted men organized into the command, supply, and communication section and 3 rifle platoons.

b. Command Section (5). The company commander, executive officer, 1st Sergeant, ¼-ton truck with driver, and personnel carrier with driver.

c. Supply Section (3). The company supply sergeant, armorer, 2½-ton truck with driver.

d. Communication Section (6). Communication chief, 3 radio operators, radio mechanic, and 2½-ton truck with driver.

e. Medical Attachment. One aid man from the battalion medical section accompanies each platoon. Litter bearers are drawn from the trains element, as required.

f. Support Fire. Paragraphs 154 through 156.

g. Rifle Platoons. The rifle platoons are composed of a platoon headquarters, a weapons squad, and 3 rifle squads.

Section V. TYPICAL REORGANIZATION OF BATTALION HEADQUARTERS, AND HEADQUARTERS AND HEADQUARTERS COMPANY

16. Battalion Headquarters

a. Combat Element. The combat element of battalion headquarters is under the immediate control of the battalion commander. It operates the battalion command post, providing the staff agencies necessary for the conduct of tactical operations.

b. Trains Element. Members of the battalion staff sections not required for the forward echelon become part of the trains element. The trains element is commanded by the senior officer present and is composed of the elements shown in figure 23.

17. Headquarters and Headquarters Company

a. Combat Element. The combat element of headquarters and headquarters company consists of the enlisted men necessary to establish, operate, and defend the battalion command post, including its communications and intelligence facilities, and thus provides the battalion commander with the means to control the tactical operations of his battalion. The combat element of headquarters and headquarters company is commanded by the company commander. He establishes mess facilities for the command post personnel. He provides a limited number of personnel and weapons for the emergency defense of the command post against enemy attack.

b. Trains Element. The trains element of the company is located with the battalion rear echelon. It is composed of all elements of the company not operating in support of the forward echelon. Available personnel of the company may be detached and used by the division engineer on an engineer task elsewhere.

18. Company Headquarters

The company headquarters will be organized into a command group and trains element. The command group will consist of the company commander and sufficient personnel and communication equipment and vehicles to command and control the company. The trains element will consist of all other personnel, equipment, and vehicles.

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By Order of *Wilbur M. Brucker*, Secretary of the Army:

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Chief of Staff.

Official:

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NG: State AG; units—⅙ requirements for Active Army.

USAR: Same as Active Army.

For explanation of abbreviations used, see AR 320–50.

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